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Message from the Editor-in-Chief

Dear Colleagues,

TOJET welcomes you. This journal was initiated in October 2002 to share knowledge with researchers, innovators, practitioners, and administrators of education. We are delighted that more than 848000 researchers, practitioners, administrators, educators, teachers, parents, and students from around the world visited TOJET. It means that TOJET has diffused successfully new developments on educational technology around the world. We hope that volume twenty-three, issue four will also successfully accomplish our global educational goal.

I am always honored to be editor in chief of the TOJET. Many people gave their valuable contributions for this issue. I would like to thank to the guest editor and editorial board of this
issue.

The guest editor of this issue was Assistant Professor Dr. NADIAH BINTI ABDUL AZIZ from Tunku Abdul Rahman University of Management and Technology, Kuala Lumpur, Federal Territory of Kuala Lumpur, Malaysia. TOJET thanks the guest editor and the editorial board of this issue.

October 01, 2024

Editors,

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A Case Study on Critical Thinking and Artificial Intelligence in Middle School

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ABSTRACT
The purpose of the case study was to understand the use of technology, particularly AI, for public middle school teachers in Michigan for critical thinking and problem-solving skills among students. The theory that guided this study was the constructivist theory. The constructivist learning theory involves people learning from their experiences and prior background knowledge. Consistent with the case study, the focus was on using AI in the classroom to engage learners and create criical thinkers and problem solvers for 21st-century skills. This qualitative study primarily sought to investigate educators' views regarding students' critical thinking abilities and assess how educators use artificial intelligence in the classroom to facilitate student opportunities to participate in problem-solving activities. The qualitative case collected data from middle school educators and gained insight into experiences with technology, particularly AI, in the classroom. Data collection consisted of observations and interviews. The analysis used triangulation to determine themes and reveal if AI correlates in the classroom with instruction to create critical thinking skills and authentic experiences. The results from the study included a minimal amount of AI in the middle school setting, participants not being comfortable with how to implement AI in the educational setting, and students not progressing adequately in critical thinking.
KEYWORDS constructivism, Artificial Intelligence, personalized Learning, critical thinking

INTRODUCTION

The educational system, is in question if students are being prepared to be critical thinkers and have the necessary 21st century skills. Critical thinking takes on new meaning to different people. As time progresses society and educational systems as a whole must adapt to the changing times including the technical society that is rapidly forming. The increasing integration of artificial intelligence (AI) across various sectors has yet to be fully embraced by the educational field, which struggles to find a balance between technology and traditional methods. However, the potential of introducing artificial intelligence technologies in schools is valuable, leading to student-centered learning opportunities. AI, a transformative force in societies, can potentially alter the educational setting, offering a new way for student engagement in learning. This potential could contribute to students working through additional application tasks in school to prepare to be critical thinkers. The US Census Bureau (2023) indicated that student enrollment in elementary and secondary schools reached 49.4 million in 2020, with projections suggesting a decline to 47.3 million by 2030, representing a two percent reduction. The teaching workforce is expected to diminish by five percent, resulting in 3.5 million teachers. As technology, particularly artificial intelligence, continues to evolve, the education landscape may transform, potentially reshaping the skills required for future employment (The Future of Learning, 2024).

The educational system needs to catch up in providing relief for educators in meeting the variety of student needs to prepare students for college and careers and to meet the demands of students. Research is emerging on incorporating AI into educational practices and preparing students for a technical world. This article examines how AI is used in middle school education to strengthen students' problem-solving and critical-thinking skills, essential for success in the 21st century. If we need to ensure students are prepared for the future, then we need to change the practices of the educational field. The time for change is now, and we must act to ensure our students are equipped for future challenges.

Students live in an advancing technological society, and preparation for the future is vital to an ever-changing society. Education needs to catch up (McDiarmid & Zhao, 2022). Research shows that AI offers many new technology advancements and can support various educational needs. The literature has discussed AI, but debate remains on how it aligns with academic practices. However, AI's capacity to shift educational content to each student's learning styles and needs offers a promising future for all learners. For instance, AI can analyze a student's learning pace and style and then adapt the curriculum and teaching methods accordingly. This personalized approach can significantly enhance learning outcomes (Walter, 2024). The problem is that students lack the critical thinking and problem-solving skills needed to engage in learning effectively and struggle to apply what they know to practical situations. This problem is also linked to the relationship between knowledge and motivation (Almulla, 2023). Critical thinking skills include expanding the thinking of knowledge and creating reflective judgments

through problem-solving opportunities (Dwyer, 2023). Students exhibit limited essential skills of thinking and low development (McCormick et al., 2015).

This case study explores AI across various sectors to gain understanding if AI can be leveraged to benefit education and foster critical thinking as AI evolves in the middle school setting (Schiff, 2021). The research question in this qualitative study aims to explore educators' perspectives on students' critical thinking skills and to understand if AI creates opportunities for students to engage in problem-solving in the educational setting. Limited research has been conducted on middle school student's preparedness for 21st-century skills and the potential role of artificial intelligence in addressing their lack of readiness. Future individualized learning opportunities exist with the power of AI, which creates individualized instruction based on the demands of the student learning goals and provides more tailored education (Ayeni et al., 2024).

Chat GPT is one of the most intelligent machines today, with the possibility of doing away with traditional learning assignments and assessments (Zhai, 2022). Still, additional research highlights that it can provide personalized learning, aid for language learners, and assist in research, writing, and exam preparation (Allam et al., 2023). Chat GPT is not even a year old from the introduction, but many people already have a connection to it in some way. The idea of Chat GPT in the classroom takes on a controversial role. There are few findings of teacher results using Chat GPT in the classroom. This is something that this research stems from to gain additional perspective, and additional research will be necessary.

Customized learning and the potential for opportunities for critical thinking and problem-solving are more likely to be coexistent (Etefe, 2023). Researchers, educators, employers, and policyholders worldwide relate that critical thinking is one of the skills needed in education and society (Thornhill-Miller et al., 2023; Cenka et al., 2022). A strength of Chat GPT is that the components are closely connected to people's daily lives, there is a deeper connection with individuals, and patterns of behavior can be learned over time (Yu, 2023). The role of Chat GPT in the educational field potentially alters the role of the teacher as a facilitator, a learning partner, and, more importantly, creating new learning (Shidiq, 2023). The support for technology integration and the potential for personalized learning through experimental and practical experiences are more likely to occur. Research reveals that activity-based learning provided significant gains in critical thinking, problem-solving, and collaboration, and the blend of technology created more essential opportunities for learner engagement (Shoul et al., 2024; Li et al., 2024). The question would be, what does this look like in the classroom through implementation, success, and challenges?

The significance of the case study is to understand how to implement instructional material to various learners, keep learners engaged and challenged within their learning capabilities, and use critical thinking skills. Diversity among student learners has only widened, and students come to the classroom with skills on and above grade level, but many are behind multiple grade levels. Teaching a direct lesson to the whole class might no longer be a favorable way to reach the learners where they are with their interests and understanding. Prior knowledge ensures students succeed with the task, but previous knowledge can be at different levels. The concern is whether the educational system successfully meets the needs of all students. Students must be equipped to live in an environment that continues to change and progress. Technology is not going to go away but only continue to advance. With all the new technology and AI components, the research looks to understand where this fits into the classroom and meets the needs of students.

The criteria about both the internal and external dimensions of the educator's role and students' learning and comprehension reveal a disparity in assessment outcomes (Morgan et al., 2016). Students' performance data significantly influences the educator's evaluation score, underscoring the need to explore strategies to enhance teaching effectiveness in a middle school environment. With the ongoing trend of re-shaping parts of education, research has favored personalization with the use of AI in the classroom to provide students with more meaningful experiences and opportunities for critical thinking. The skills of critical thinking and new skills for tomorrow need to be taught quickly (Abrams, 2024). Technology is progressing quickly and inequity exists in the schools. A concern is that students continue to be grade levels behind in learning, what tools are being used currently. With AI, students' individual learning styles and skill levels are more readily available and can be created from their personalized learning and assessment. Technology allows learning to be done within classroom walls. Again this creates a different teacher role but a role where the educator, expands the students individual learning.

Theoretical Framework

The constructivist approach to learning with AI strongly emphasizes students actively constructing knowledge through hands-on experiences and interactions. AI serves as a tool to facilitate and personalize these learning processes (Grunbaugh et al., 2023). The constructivist theory aligns with the research, as learning is created through

new and existing knowledge. The teacher's role in a constructivist learning environment is crucial and integral, as they facilitate and guide students' learning, creating a student-centered learning environment (Keiler, 2018). Educators are not just facilitators but are at the heart of the learning process, guiding students toward a deeper understanding of the subject matter. Their role is irreplaceable, even in an AI-integrated educational system. John Dewey valued learner experiences and emphasized engaging in real-life situations to solidify learning and promote social learning opportunities. His philosophy, experimentalism or instrumentalism, primarily focused on the human experience's role in education (John et al., 2014). The educational philosophies of John Dewey significantly influence student achievement and the interplay between the environment and society (Dewey, 2002). Future research indicates that academic approaches should integrate critical thinking, problem-solving, assessments, and additional preparation for future studies (Livberber & Ayvaz, 2023). Classroom experimentation with Chat GPT is feasible and can provide valuable experiences (Rudolph et al., 2023). Interactive learning with Chat GPT has boosted students' motivation, engagement, and critical thinking skills (Scloul et al., 2024). Chat GPT has the potential to create more hands-on learning and opportunities for students to align their learning with their interests and backgrounds.

However, integrating AI into education also raises potential challenges and ethical considerations. For instance, there are concerns about data privacy, algorithmic bias, and the potential for AI to replace human educators. (Akgun & Greenhow, 2021). It is essential to address these issues to ensure that AI is used responsibly and ethically in education. However, the potential of AI, particularly Chat GPT, to provide personalized learning is immense. Integrating Chat GPT in education could further empower teachers and create significant opportunities for critical thinking and enhanced learning outcomes (Tlili et al., 2023; Qadir, 2022). Integrating AI in student learning through practical application presents opportunities to engage students and strengthen their twenty-first-century skills. AI provides learner-centered support and personalized instruction to address individual student needs (Ng et al., 2023; Li et al., 2024; Liu et al., 2022). Chat GPT can create learning tailored to students from diverse backgrounds (Prananta et al., 2023). A learning environment that creates personalized learning creates more opportunities for students to be met where they are and to engage in relevant experiences. This potential for customized learning through AI should inspire optimism about the future of education.

Adaptive/customized learning is crucial in education systems and in working toward higher student achievement levels (Xie et al., 2019). Children participating in their goals are assumed to be more likely to learn more effectively (Dishon, 2017). Psychological studies indicate that children who lack challenges or prior knowledge in the learning process are more prone to underperform academically. Providing cognitive stimulation to every student is essential, as this approach fosters academic success for all children (Dumont & Ready, 2023).

The fulfillment of the gap in learning contains two additional factors: a call to new possibilities of applications and a continuous adaption of AI as more sophisticated results show value (Jose et al., 2021). Technology is essential in offering excellent personalized learning opportunities (Semshack & Spector, 2020). With technology, teachers can meet each student's demands, which is challenging. Dewey argued that education should stem from students, interests, experiences, and abilities (Dumont & Ready, 2023). Research highlights that personalized learning is not a new way to offer instruction but can offer a more significant opportunity for equity in learning. Some studies show that adaptive learning is more effective in raising students' achievements than traditional non-adaptive instruction (Dumont & Ready, 2023). Future studies suggest that academics must find new teaching strategies and methods that include critical thinking, problem-solving, assessments, and additional preparation for future academics (Livberber & Ayvaz, 2023).

STUDY

Research data should be gathered within theoretical frameworks to demonstrate their utilization, albeit to a limited capacity (Luft et al., 2022). Middle school students have access to technology. However, with the advancement of artificial intelligence, studies are scarce exploring its potential contributions to the middle school setting (Lee & Kwon, 2024). The design process chosen was a qualitative study because research on the topic has often been conducted through quantitative data collection, but not at the middle school level. The qualitative case study also gives an insight into people's beliefs related to the topic and their experiences. A hermeneutic approach in a case study was chosen to analyze and interpret data by focusing on the meaning and context, relying on the researchers' understanding and interpretation of the situation. Participants were voluntarily selected for the survey. The participants were teachers with around five years of experience and twenty years of teaching experience. The backgrounds varied; some teachers came from charter and private schools before working at a public school. Teaching subjects included math, science, language arts, STEM, and special education courses. The research was conducted at a middle school in 6th through 8th grade in Michigan. The school is urban and is a Title I school with over ninety languages represented in the district. Data was collected through classroom observations, teacher interviews, and collection of lesson plans. The classroom observations were around thirty minutes of time. Data

collected included teacher time teaching whole group, classroom set-up, interaction with teacher to student, technology used, critical thinking opportunities, and personalization of instruction. The interview consisted of ten questions that were open ended. The questions asked if teacher's use technology, AI in the classroom, what opportunities students have for showing learning, if student's are able to use problem solving and critical thinking skills. The document included a rough over view of the lesson plan format.

Findings

The research's findings were quite compelling. AI is generally not used in the classroom, except for two classroom lessons that used a little form of AI in the instruction. The educators said they would like to know more about incorporating AI into the classroom learning environment but need professional development because the technology is too overwhelming. Professional development is offered, and teachers are required to take a minimum of thirty hours a year, but they have not been to one on using AI in education.

Overall, all participants were concerned that students do not have the necessary problem-solving and critical-thinking skills, which was a significant concern for future learning. Educators all agreed that students' problem-solving/critical thinking skills need to be addressed and taught; students are significantly behind in pushing thinking and solving fundamental problems. My teacher observations revealed each classroom with an overall teacher lesson directed to all students. From the lesson, students practiced the learned skill in the same manner. Personalized learning was only partially observed when observing the participants. The observations included students completing their writing ideas when creating a summary. Customized learning was not observed with AI. The only observation of hands-on learning was in a STEM course with measurements but the teaching was all teacher-led.

The results of the observation collection and the interview answers were read multiple times to look for common themes. The website dovetail.com was used to sort and find common themes. One participant said, "The approach to teaching needs to change; students need to be given choice." Another participant mentioned, "Critical thinking skills are so valuable, but they must be taught many times and at a young age to prepare students for what this means." Prior knowledge was built on in the math, science, and special education classrooms, this was teacher led. Three main themes were identified and are listed below.

Lack of AI:

Teachers are not opposed to using AI in the classroom and have had some personal experience using AI. The participants are not sure where to start with AI in education. There is a gap in knowledge and confidence among educators. The participants are overwhelmed with the day-to-day requirements and only have a little time to add more to their requirements. The participants feel that AI could provide helpful student data and ease some of the teacher's requirements with lesson plans, assigned tasks, and assessments. Data collection will also help teachers create opportunities for more personalized learning to meet the needs of each individual. A few teachers have tried to differentiate as much as possible, but consistency is complicated. Each subject area also has curriculum requirements and common core standards. The Science and Math courses do have online textbooks but I did observe these being used in the classroom. A participant said, "AI sounds interesting to use in the classroom but no idea where to start." A language arts educator is concerned about AI possibly taking away form student thinking and would like to know more about how AI could further discussion and thinking along with pushing student writing." One participant of all twelve does not like to use any technology in the classroom and that was for a math classroom.

Student Engagement:

Students' lack of critical thinking, problem-solving skills, and motivation could be interrelated, possibly stemming from teaching methods that need to engage or challenge them sufficiently. When asked if students are critical thinkers, one participant replied, "No, because everything is spoon-fed to kids; kids do not see the point in why they need to learn something; they do not see the value." Four of the educators made a comment, "critical thinking skills are hard for kids, and these skills need to be taught." Another participant mentioned that the science curriculum has built in critical thinking questions but it is a struggle as well as a concern being able to get students engaged and pushing their thinking." Prior knowledge on the topic needs to be available for students to access. Also prior knowledge needs to be built on from learned concepts and if students do not have the interest level or the motivation this causes a loss connection from the material.

While observing a few of the participants' classrooms, the teachers did try to push students' thinking, but the academic conversations especially needed more guidance provided to push students in expanding their thinking. It was observed that students were challenged with context; however, due to a lack of knowledge or motivation, higher-level thinking was not noticed when students were answering questions. A connection could also be made

between a lack of connection to prior knowledge and disinterest and lack of prior knowledge to build on. Teacher participants did incorporate some prior knowledge into the learning process, but it was a whole group, and it was observed that not all students were engaged with what was being taught.

Diversity and Personalization:
The challenges in personalizing learning are exacerbated by the diverse student population and the varying levels of skill and prior knowledge, highlighting the complexity of modern classrooms. Four of the twelve participants mentioned in their interview that students need more personalization in their learning and more choices. Participants are concerned with the number of students who are more than two grade levels behind and how they catch up with over two years of learning, and this if is even an interest to the student/s. One participant mentioned that in the Science class, "when students know something about the topic, they are engaged, ask questions, and when the opposite is true, that is where the student either acts out or shuts down." The education system does continue to push along students to the next grade at least at the middle school level even if they are not academically prepared.

Limitations
The limitations of the case study included only a middle school setting being used for the collection of data. There was no collection of data from other schools to compare if AI is being used in the classroom and if critical thinking skills are extended with students and the advancement of technology.

Future Research Recommendations
Future research recommendations include studying AI and the implementation of AI in the classroom. The case study needed more data on teachers using AI to push critical thinking and problem-solving skills in the classroom. AI is still relatively new to the implementation of AI in the classroom, especially in middle school. Additional research should be conducted to include best practices for AI in the classroom to push student thinking and to create further opportunities for students to learn from prior knowledge.

Conclusion
The purpose of the case study was to understand the use of technology, particularly AI, for public middle school teachers in Michigan for critical thinking and problem-solving skills among students. The problem is that students lack the critical thinking and problem-solving skills needed to engage in learning effectively and struggle to apply what they know to practical situations. The significance of the case study is to understand how to implement instructional material to various learners, keep learners engaged and challenged within their learning capabilities, and use critical thinking skills. Pushing students to their full capability continues to be something that educators are committed to when entering the profession. With the amount of students that continue to behind in learning and the pressure on the schools and the teacher to maintain high growth rates amongst students it is a time to look at what is missing. Students today are being brought up in a technical society. Many are introduced to technology as a toddler. Students need to learn how to use technology, AI as an academic tool. Students need to be able to work when work gets challenging and push their critical thinking skills. Many educators are exhausted and they need resource to ensure that learners have the right tools to exist in ever changing society.

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Academic Support of Virtual Environments Perceived by Higher Education Students During Covid-19

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ABSTRACT
It will be very useful for the E-Learning departments, dean's offices, and academic monitoring of the higher education institutions (HEI) of El Salvador to know the perception that students have regarding the academic support of the virtual learning environments (VLE) implemented or strengthened as a response to the events generated by the Covid-19 pandemic. Although this event is in the health area, it has had an impact on other areas, including education, leading HEIs to advance in the virtualization of content for the care of their students. This research allowed us to know the perception of students regarding virtual environments as facilitators of learning and guarantors of favorable social environments in the development of content. Opportunely, the topic is relevant during the social distancing due to the pandemic and, undoubtedly, provides new data to support other studies. In this descriptive study, with a quantitative approach, with a non-probabilistic sample, 279 students from several HEIs from El Salvador participated, to which an online survey was given to know their perception of VLE as learning facilitators. As a main result, it was obtained that such perception depends on your previous experience in VLE.
Keywords: Virtual Learning Environments (VLE), Learning Facilitator, Social Learning Environment, Student Perception, Higher Education.

INTRODUCTION
In recent decades, the distance education modality has gained its share in the higher education market over face-to-face training (García Aretio, 2009, p. 12); and according to Carmona Suarez & Rodríguez Salinas (2017), it is due to good practices in compliance with e-Learning standards, which are supported by information and communication technologies (ICT) applied to education in search of guaranteeing high-quality virtual programs; however, Pando (2018) expresses that:

> "The impact of ICT breaks with some expectations, placed on them for the improvement of teaching-learning processes, which has found in this trend little utility: the objectives, concept, methods, organization, components of such processes, obviate the role of the student as the constructor of his learning, or if he does, then, it derives in spontaneous processes of knowledge apprehension under undefined criteria and probably, far from formal educational ideals. This has a negative influence on the student, both academically, emotionally and axiologically" (pp. 481-482).

For their part, Aguirre, Viano, & García (2015) express that ICTs offer the possibility of reconstructing and reinterpreting the possibilities of teaching and present a challenge for higher education consisting of finding more open and flexible models that favor the student to become responsible for the construction of their learning.

It is this last point that has led higher education institutions (HEIs) to offer virtual education and attract a portion of students interested in this form of learning. In the same dynamic, they are the ones who evaluate the virtual environments in which they are participating, giving way to their perception regarding the functional value of virtual environments for education (Serna-Loaiza et al., 2020) and their facilitating role in learning (Aguirre et al., 2015). This perception is influenced by age, gender, previous experiences, attitude towards technology, learning styles (Keller & Cernerud, 2002), and the way the university would have implemented the virtual teaching system.

HEIs decide to implement virtual education due to various circumstances, just as students choose to enroll in their programs motivated by their interests (Sánchez Miranda et al., 2019); however, due to the COVID-19 pandemic, in 2020 the legislative authorities of El Salvador decreed a State of National Emergency and the suspension of classes and work in the national education system (Decreto Legislativo 593, 2020 art. 7) and the Ministry of

Education of El Salvador issued instructions for educational continuity indicating virtual education strategies, including HEIs (Ministerio de Educación Ciencia y Tecnología de El Salvador, 2020).

Some universities had already ventured into this form of teaching and learning more than others; however, all of them had to abruptly implement ICTs to have virtual environments for education, with the result that all students enrolled in face-to-face mode became virtual education students. Given this, this study aims to determine the academic support of virtual learning environments (VLE) perceived by students of Higher Education Institutions (HEIs) in El Salvador during the social distancing by COVID-19 in the period from August to September 2020, and is broken down into two specific objectives:

- To assess the perception that students of Higher Education Institutions (HEI) in El Salvador have of virtual environments as facilitators of their learning, implemented during COVID-19.
- To assess the perception of the social learning environment held by students of Higher Education Institutions (HEI) in El Salvador regarding the imminent implementation of virtual learning environments during COVID-19.

This study is novel because, during the pandemic, at the time of data collection, only a few columns have been written in national newspapers about this educational phenomenon, but there has not been a study presenting the perception of the students involved in the process. It presents a brief bibliographical review of the main topics under review, followed by the research questions. The methodology used is non-experimental and descriptive, with a quantitative approach, having applied a Likert scale questionnaire to 279 students from different Higher Education Institutions nationwide. It highlights as results that 70.61% are familiar with virtual platforms and have skills to participate in virtual learning environments, 57,35% perceive that the virtual environments implemented facilitate learning and 58,42% perceive a favorable social environment. These data are followed by discussion, conclusions, and recommendations.

Literature review

Connectivity

According to the Secretariat of Innovation of the Presidency of El Salvador (2020), the penetration of fixed broadband (7.7%) and mobile broadband (54.5%) in the country is among the lowest in Latin America and is far from the average of the Organization for Economic Cooperation and Development (OECD) (33.7% and 121.1% respectively), which hinders access to online education services due to the limited level of digital infrastructure and the low level of digital skills and capabilities.

Similarly, it states that 42% of those under 25 years of age and 54% of those over 66 years of age do not have an Internet connection, and more than 90% of those connected do so with low-speed plans that do not allow online education solutions.

In the same document, the institution states that the main reason for these situations is that telecommunications service providers are mainly located in densely populated areas.

The consultation of the connectivity coverage maps by Internet service providers shows that San Salvador, in the central area of the country, is a department with almost complete coverage, in addition to being home to the largest number of universities in the country. This factor can make a difference in the perception that university students from the different zones of political division in the country have about VLE as academic support.

Virtual Education: Advantages and Disadvantages

The connectivity available to students is an important factor for HEIs in the implementation of the virtual education strategy, which has been growing in recent years. According to García Aretio (2017), non-face-to-face education is taking more advantage than the conventional modality, having to face the challenge of new technologies; of course, since distance education appeared to date, there have been significant changes in the way of teaching until reaching what is now known as virtual education.

Academic support of virtual learning environments has become part of the education system all over the planet (Nambiar, 2020). The situation generated by the COVID-19 pandemic was a key factor that shifted teaching and learning from the traditional classroom to a virtual approach. Therefore, because of this, universities were forced to change their academic activity with students and teachers to an exclusively virtual world (Coman et al., 2020). To make this academic online process work, the essential elements are internet coverage and the availability of electronic devices in the involved population (Basilaia & Kvavadze, 2020). Besides the aforementioned, other factors of online learning are related to flexibility in time and house, learners' and teachers' involvement, and other different elements that online learning possesses (Simamora, 2020). On one hand, Segura Vera (2021) in his study

suggests that in virtual learning environments (VLEs), the process of mediation through feedback takes on greater relevance given the structural characteristics that determine the success of learning in these environments. Moreover, Villacis Lizano et al. (2021), in their study, found that until five years ago, academic research on VLEs in education has increased significantly.

As expressed by Rodríguez (2011), higher education finds among its challenges the incorporation of ICTs to generate pedagogical models based on virtual education. Thus, Aguirre(2015) identifies virtual learning environments as spaces to support face-to-face or, as included by Hinojo & Fernández(2012), blended or even completely virtual education. These spaces use technological platforms both hardware and software for teaching and learning where students, teachers, and study materials are found to support education in different modalities, among which is Moodle used to create virtual classrooms.

Virtual Learning Environments (VLEs) have been incorporated into many higher education institutions (HEI) (Al-Nofaie, 2020). These are delivered in two modes of online courses: Synchronous and asynchronous. The former refers to the real-time delivery of course content designed; meanwhile, the latter might occur through tools such as e-mails, discussion boards, blogs, wikis, chats, or multimedia resources. Therefore, this has led HEI to offer virtual education and attract a portion of students interested in this form of learning. In the same dynamic, they are the ones who evaluate the virtual environments in which they are participating, giving way to their perception regarding the functional value of virtual environments for education (Serna-Loaiza et al., 2020).

Some investigations have studied the importance of this topic before. For example, Yandri Zambrano-Zambrano & Carlos García-Vera (2020), found that the promotion of the use of VLEs is a necessity to adapt teaching practices to today's educational demands. Likewise, Soto (2020) suggests that the teacher must give timely and clear answers to the students' doubts, and the students, and the latter must maintain permanent and effective communication. Therefore, being a teacher requires a social responsibility, and a commitment, to play an active role in the virtual environment, fulfilling each of the functions so that students acquire knowledge and skills (Rizo, 2020). On the other hand, the student must also be an active subject of his/her learning, considering the roles represented in self-discipline, self-learning, and knowing how to analyze, reflect and participate in collaborative work, and participate in collaborative work (Rizo, 2020).

Nevertheless, in the Salvadorean HEIs context, little research has been studied regarding this issue. Unlike the aforementioned, it is important to identify factors that the shift from face-to-face classes to a virtual environment affected the student's learning and how professors accompanied it. Given the aforementioned, this study aims to determine the academic support of virtual learning environments (VLE) perceived by students of Higher Education Institutions (HEIs) in El Salvador during the social distancing by COVID-19 in the period from August to September 2021.

This study is novel because, during the pandemic, at the time of data collection, only a few columns have been written in national newspapers about this educational phenomenon; nevertheless, there has not been a study presenting the perception of the students involved in the process. This is formed from the recognition of the benefits they were promised when moving from a face-to-face modality to a completely virtual one. Naffah (2016) identifies variables that intervene in this construct, such as their attitude towards its use, usefulness, ease of use, skills shown by the teacher, autonomy in learning, and others.

Also, it presents a brief bibliographical review of the main topics under review, followed by the research questions. The methodology used is non-experimental, and descriptive, with a quantitative approach, having applied a Likert scale questionnaire to 279 students from different Higher Education Institutions nationwide. It highlights as results that 70.61% are familiar with virtual platforms and have skills to participate in virtual learning environments, 57,35% perceive that the virtual environments implemented facilitate learning and 58,42% perceive a favorable social environment. These data are followed by discussion, conclusions, and recommendations.

Among the advantages and disadvantages of virtual education are in table 1:

Table 1. Advantages and disadvantages of virtual education

Advantages of virtual learning	**Disadvantages of virtual education**
- The development of modern and advanced technologies offers multiple opportunities for educators, especially in the development of new educational models (Estrada Sentí et al., 2015).	- Virtual dialogue is not functional because online communication is asynchronous and dialogues in chats or discussion groups usually revolve around a few students (Ralón et al., 2004).

- Although it may be a more complex task, they facilitate personalized feedback for the student (Hinojo & Fernández, 2012). - Better participation in collaborative work(Ezequiel & Mendoza, 2013). - Reduces students' travel, food, and lodging costs. - The student is supported in the creation of meaning and construction of knowledge (Eiliana & Castro, 2012). - Dung (2020) lists some of those: Protecting individual health and community safety Saving the travel time Exposing to new forms of learning Keeping up with the original plan for the semester Having extra time for self-study Having easy access to online resources	- Inconsistent use of the platform. Some teachers are not always willing to respond extensively to student queries (Keller & Cernerud, 2002). - Little knowledge of the minority of students about the use of ICT for learning (Monge Nájera & Méndez Estrada, 2007). - Dung (2020) lists the following: Extensive time staring at digital screens Lack of body movements Lack of conditions for developing social interaction skills Fear of online assessment Suffering from concentration lost Lack of peer interaction in a virtual classroom Difficulties in hearing the voice of the instructors Lack of time and condition to practice speaking with peers and teachers Difficulties in acquiring the contents of the lessons Lack of interaction with instructors Difficulties in following the study schedules, lack of self-discipline

Students experience virtual learning environments (VLE)

Even though ICTs offer opportunities to venture into virtual education (Estrada Sentí et al., 2015), few students are knowledgeable about the use of these technologies for learning (Monge Nájera & Méndez Estrada, 2007). According to Abad López & Saenz Niño (2020), the student must have the digital competencies that allow him/her to manage basic elements related to Information and Communication Technologies (ICT), as well as the technological resources for the optimal development of the tasks. Similarly, study habits may be affected when suddenly moving from a face-to-face modality to a completely virtual one because under virtual environments, as Sierra Varón (2013) expresses, the student is the holder of knowledge and can make sense of what is found in his teaching-learning process through a more active position in his academic training process.

On one hand, Sierra Varón (2013) defends the thesis that the virtual education modality favors the development of autonomous learning in students, thanks to the support of ICT, being possible when the objective is that students learn to learn; of course, for this, it is necessary to develop the appropriate conditions such as virtual learning environments that are easy to use, appropriate design of materials, develop the competence of text interpretation and others that favor learning governed by the student himself.

On the other hand, the social environment generated during online learning involves the teacher and the student; however, there is another interactivity between the members of the group of students and according to Estrada Sentí et al. (2015), the interaction between collaborative work groups and new educational technologies generally produces positive results in students.

Finally, these environments include discussion forums, platforms for group video calls, social networks used for educational purposes, and learning communities, among others. For this to be favorable, the materials designed must be easy to understand and with the possibility of discussion among peers in the group. This leads to instructional design models that, according to Chiappe Laverde (2008), focus on the organization of an instructional process composed of phases, within which activities or sets of activities are developed that make up more specific processes, focused on the achievement of a particular objective. In this sense, this author indicates that the design of materials can have the following purposes:

a) Receptive: Elaborated to facilitate the transmission of a lot of information.
b) Directed: Elaborated from the simple to the complex, contemplating moments of evaluation and feedback.
c) Guided discovery: Provides adequate scenarios for problem-solving and the necessary resources to achieve it.
d) Exploratory: Elaborated for the student to find and process relevant information

Research Questions

Since, in higher education institutions in El Salvador, virtual learning environments were suddenly implemented, converting all students from a face-to-face modality to a completely virtual one, the following research questions were formulated:

General Question

What is the academic support of virtual learning environments (VLE), perceived by students of higher education institutions (HEI) in El Salvador during the social distancing by COVID-19 in the period from August to September 2020?

Specific Questions

How do students of higher education institutions (HEIs) in El Salvador perceive virtual learning environments as Facilitators of their learning, implemented during COVID-19, Will there be significant differences between the perception of virtual learning environments (VLE) as facilitators of learning, according to their gender and political division zone of the country (Eastern, Western and Central), How do students of higher education institutions (HEIs) in El Salvador perceive the social learning environment in the face of the imminent implementation of virtual learning environments during COVID-19?

METHODOLOGY

Research Design

This research is descriptive as defined by Hernández-Sampieri et al. (2014) as it describes the perception of students of a non-probabilistic sample coming from different universities in El Salvador regarding virtual environments as learning facilitators during the COVID-19 pandemic.

A multiple-choice survey was conducted to collect the data required to know the students' perspectives. This study was developed with a quantitative approach in a non-experimental and cross-sectional design executed from August 15 to September 14, 2020.

Participants

The instrument to determine the perception of academic support of virtual learning environments (VLE), perceived by students of Higher Education Institutions (HEI) in El Salvador during the social distancing by COVID-19, was applied to 279 students average age range was between 21 and 30 years old, from different Higher Education Institutions nationwide.

Table 1: *Participants*

Characterization	Quantity
Gender	
- Female	172
- Male	107
Region of country	
- Eastern	86
- Central	109
- Western	84
Type of university	
- Public	40
- Private	236

Instrument

A self-application instrument was conducted for the participants. However, before sharing the instrument with the participant sample, it was validated by experts to know their assessment and modified according to their observations. Subsequently, a pilot test was conducted with 30 participants who share similar characteristics to the study population to validate and improve the quality of the items contained in the questionnaire. The instrument is divided into two parts: the first reveals aspects of sociodemographic information and the second includes eight questions that respond to the academic perception that students have of the virtual environments in which they participate in the virtual modality. Each statement is constructed to be answered on a Likert scale with the following options: 0=Not present, 1=Slight, 2=Moderate, 3=Severe, and 4=Very severe.

Procedure

Once the analysis corresponding to the pilot test had been carried out, the field phase was continued by providing the instrument to the sample selected by convenience, being the students identified by professors at each classroom,

during data collection which was processed using the free software Perfect Professionally Presented Statistics (PSPP).

The data collected were subjected to Cronbach's Alpha reliability test, which resulted in a score of 0.84, indicating good internal consistency (Frías-Navarro, 2020; Oviedo & Campo, 2005).

The Kaiser Meyer and Olkin test reported KMO = .89 while Bartlett's test of sphericity determined the Chi-Square Approx. = 804,30 with degrees of freedom = 28 and significance = .000. According to Crespín Elías (2016), the KMO value obtained is in the acceptable range and the significance of Bartlett's test contrasts that the correlation matrix is an identity matrix, so the Exploratory Component Factor Analysis was performed, which identified three factors that explain 71,9% of the variance: *virtual environments as a learning facilitator, previous experience in virtual platforms and social learning environment strategy*, which can be seen on table 2.

Table 2: *Exploratory component factor analysis*

	VE as a learning facilitator	Previous experience	Social learning environment strategy
I am not familiar with the virtual platform of my university.	.19	1.33	.07
Virtual education impedes autonomous learning for both teachers and students.	.40	.34	.54
The assignments to be developed in my virtual classes are confusing.	.79	.28	.28
The academic skills to cope with online educational processes are lacking.	.97	.22	.34
The materials used online are scarce for the real demand of the subjects.	1.06	.00	.43
The e-learning environment limits my academic social environment.	.61	-.11	.74
Online collaborative tasks are complicated to achieve the real educational challenges.	.21	.12	1.10
The design of the material affects the reception of meaningful learning in online subjects.	.49	.06	.90

Following the tests described above, the results were presented in summary tables that reduce the Likert scale options to two results that indicate a perception in favor or against the factor evaluated by the students. The results are presented mainly in tables with a percentage reading, distributed in sociodemographic data, previous experience of students in online education platforms, perception of virtual environments as conducive to learning, social learning environment perceived by students, followed by an analysis of mean differences. Each factor is disaggregated by gender and area of the country, adding age range to the statistical tests.

Finally, the results are discussed and contrasted with other studies and the respective conclusions and recommendations are generated.

RESULTS

Previous Experience

The implementation of virtual education for all careers and subjects taught, during the social distancing by COVID-19, became a challenge for Salvadoran HEIs since all students who were enrolled in face-to-face mode suddenly had to switch to virtual mode. Many of them had no previous experience in virtual learning environments.

Of the 279 students participating in the study, only 71% said they were familiar with virtual platforms and had the skills to participate in virtual learning environments. See Table 3. Of these, 44% were female and 27% were male. That leaves 29% of students who had no previous experience in formal or non-formal courses under ICT-supported education platforms. Of these, 18% are female and 11% male.

Table 3. *Previous experience in virtual learning environments (VLE) according to gender.*

	Gender					
Experience	Female	Percent	Male	Percent	Total	Percent
Previous experience	121	44%	76	27%	197	71%
No previous experience	51	18%	31	11%	82	29%
Total	172	62%	107	38%	279	100%

On the other hand, the participating students were distributed in the three zones of the political division of El Salvador. Table 4 shows that of the 71% of the students with previous experience in virtual learning environments, 22% are students from the Eastern zone of the country, 26% from the Central zone, and 23% from the Western zone. Similarly, 29% of the students with no previous experience are distributed as follows: 9% from the Eastern zone, 13% from the Central zone, and 8% from the Western zone.

Table 4. *Previous experiences in virtual learning environments by zone*

	Zone							
Experience	East	Percent	Central	Percent	West	Percent	Total	Percent
Previous experience	61	22%	73	26%	63	23%	197	71%
No previous experience	25	9%	36	13%	21	8%	82	29%
Total	86	31%	109	39%	84	30%	279	100%

Virtual Environments as Learning Facilitators

Of the 279 students participating in the study, 57% perceive that the virtual environments implemented by Salvadoran HEIs facilitate learning, while 43% consider that they do not facilitate learning. Of those who perceive them as facilitators, 37% are female and 20% are male. Of those who perceive that virtual environments do not facilitate learning, 25% are female and 18% are male.

Table 5. *Perception of virtual environments as facilitators of learning according to* gender

	Gender					
Facilitator	Female	Percent	Male	Percent	Total	Percent
Learning facilitator	103	37%	57	20%	160	57%
No learning facilitator	69	25%	50	18%	119	43%
Total	172	62%	107	38%	279	100%

Table 6 shows the students' perception of virtual environments as learning facilitators, distributed among the three zones into which the country is divided. Of the 279 participants in the study, 57% perceive virtual environments as facilitators of learning, with 20% in the Eastern zone, 19% in the Central zone, and 18% in the Western zone. Similarly, of those who perceive that virtual environments do not facilitate learning, 10% study in the Eastern zone, 20% in the Central zone, and 13% in the Western zone.

Table 6. *Perception of virtual environments as facilitators of learning by zone*

	Zone							
Facilitator	East	Percent	Central	Percent	West	Percent	Total	Percent
Learning facilitator	57	20%	54	19%	49	18%	160	57%
No learning facilitator	29	10%	55	20%	35	13%	119	43%
Total	86	30%	109	39%	84	31%	279	100%

Social Learning Environment Strategy

The social learning environment is important because it allows students to express their perception as to whether they feel they can socialize with other students to favor their learning. Thus, as can be seen in Table 7, of the 279 students surveyed, 59% perceive a favorable social environment, with 39% being female and 20% male. The gender distribution of the 41% who perceive a non-favorable social environment is as follows: 23% are female and 18% male.

Table 7. *Perception of the social environment strategy of learning by gender*

	Gender					
Social learning environment strategy	Female	Percent	Male	Percent	Total	Percent
Favorable social environment strategy	107	39%	56	20%	163	59%
Non-favorable social environment strategy	65	23%	51	18%	116	41%
Total	172	62%	107	38%	279	100%

On the other hand, Table 8 shows that those who perceive favorable social environments as learning strategies are distributed in the zones of the country as follows: 21% are students from the Eastern zone, 18% from the Central zone, and 20% from the Western zone. Those who perceive the social learning environment strategy as not favorable are distributed as follows: 10% in the Eastern zone, 21% in the Central zone, and 10% in the Western zone.

Table 8. *Perception of the social learning Environment Strategy by zone*

	Zone							
Social environment	East	Percent	Central	Percent	West	Percent	Total	Percent
Favorable social environment strategy	57	21%	51	18%	55	20%	163	58%
No favorable social environment strategy	29	10%	58	21%	29	10%	116	42%
Total	86	31%	109	39%	84	30%	279	100,00%

Differences in perception according to gender, zone, and age range

Given that the Kolmogorov and Smirnov test represented in Table 9, reflects that the sample does not come from a population with normal distribution for the study variables' previous experience in virtual environments and virtual environments as learning facilitators (significance .000 and .016 respectively), the Mann-Whitney U test is applied to establish the differences of medians compared with gender and the Kruskal Wallis test for the geographical area where the participant studies and his age range; while the social learning environment variable indicates that it corresponds to a normal population (significance .156), the Student's t-test is applied to compare with gender and ANOVA of one factor for the difference of means according to the geographical area and age range.

Table 9.*Kolmogorov and Smirnov test*

		Previous experience	learning facilitator	Social learning environment strategy
N		279	279	279
Parameters	Mean	1,69	6,01	7,80
Normal	Standard Deviation	1,38	3,11	3,78
More extreme differences	Absolute	.19	.09	.07
	Positive	.19	.09	.07
	Negative	-.16	-.07	-.06
Z de Kolmogorov-Smirnov		3,13	1,49	1,11
Asymp. Sig. (2-tailed)		.000	.016	.156

Table 10 shows the results of evaluating students' previous experiences and their perception of virtual environments as learning facilitators, according to gender. With a p.value > .05, the null hypothesis indicating that the differences observed in the variables analyzed according to gender are reasonably due to chance and, therefore, there are no significant differences according to gender, is not rejected.

Table 10. *Statistical tests by gender*

	U of Mann-Whitney	Asymp. Sig. (2-tailed)
Previous experience	9158,50	.946
Learning facilitator	8295,50	.165

Table 11 shows the results of evaluating students' previous experiences and their perception of virtual environments as facilitators of learning, according to the geographical area of the country (Western, Central, and Eastern).

With p.value > .05, the null hypothesis is not rejected, indicating that the differences observed in the variable of previous experiences in virtual environments analyzed according to the geographical area of the students are reasonably due to chance and therefore there are no significant differences in the students' previous experiences according to zone.

On the other hand, with p.value < .05 the null hypothesis is rejected so the differences observed in the perception of virtual environments as learning facilitators are not due to chance and, therefore, there are significant differences according to the geographical area of the students in terms of the perception about virtual environments as learning facilitators.

Table 11. *Kruskal Wallis statistical tests according to zone*

	Previous Experience	Learning Facilitator
Chi-squared	1,05	6,65
df	2	2
Asymp. Sig.	.592	.036

Table 12 shows the results of evaluating students' previous experiences and their perception of virtual environments as learning facilitators, according to their age range (15-20, 21-30, 31-40, 41-50, 51-60, 61-70).

With an alpha greater than .05, the null hypothesis indicating that the differences observed in the variable of previous experiences in virtual environments analyzed according to age range, are not reasonably due to chance and therefore there are no significant differences in the previous experiences of students according to their age, is not rejected.

On the other hand, with p.valor < .05 the null hypothesis is rejected so the differences observed in the perception of virtual environments as learning facilitators are not due to chance and therefore there are significant differences according to the age of the students in terms of perception about virtual environments as learning facilitators.

Table 12. *Kruskal Wallis statistical tests by age ranges*

	Previous Experience	Learning Facilitator
Chi-squared	2,97	9,21
Df	3	3
Asymp. Sig.	.396	.027

Table 13 shows that there are differences in the means of perception of the social learning environment according to gender; however, the Student's t-test, presented in Table 14, shows that the differences are not significant, at p.value > .05.

Table 13. *Statistics of social learning environment by gender*

		Gender	N	Mean	SD	Mean Sta. Err.
Learning Social Environment Strategy		Male	172	7,56	3,78	.29
		Female	107	8,18	3,77	.36

Table 14. *Student's t-test for independent samples: social learning environment by gender.*

		F	Sig.	t	df	Sig. (2-tailed)	Dif. Mean	Dif. Err. Dif.	Sta. Inf. of	Sup.
Social learning environment strategy	Equality of variances	.02	.902	-1.33	277,00	.184	-.62	.47	-1,53	.30
	Equality of variances not assumed			-1.33	225,19	.184	-.62	.46	-1,54	.30

Table 15 shows differences in the means of student perception of the social learning environment generated by the virtual environments implemented by the HEIs of El Salvador; for its respective verification, Table 16 presents the ANOVA test for one factor in which it is shown that the differences by geographic area of study are significant at p.value < .05.

Table 15. *Descriptive statistics for social learning environment strategy by geographic zone*

		N	Mean	Standard Deviation	Standard Error	Limit Inferior	Limit Superior	Min.	Max.
Social Learning Environment Strategy	Esat	86	7,31	3,50	.38	6,56	8,06	.00	16,00
	Central	109	8,51	3,95	.38	7,76	9,26	.00	16,00
	West	84	7,36	3,74	.41	6,55	8,17	.00	16,00
	Total	279	7,80	3,78	.23	7,35	8,24	.00	16,00

Table 16. *One-factor ANOVA for social learning environment* strategy *by geographic zone*

		Sum of Squares	df	Mean Square	F	Sig.
Social learning environment strategy	Inter Groups	9,32	2	46,16	3,8	.039
	Intra Groups	3885,04	276	14,08		

	Sum of Squares	df	Mean Square	F	Sig.
Total	3977,35	278			

DISCUSSION

According to table 18, of the 197 students who stated that they had previous experience in virtual learning environments, 65% perceive that the VLE implemented during COVID-19 *facilitates learning*, while 35% consider that they *do not facilitate learning*.

On the other hand, of the 82 students who state that they have *no previous experience* in VLE, only 38% perceive that these environments are *learning facilitators* against 62% who state that they *do not facilitate learning*.

Pearson's χ^2 reports a p.value = .000 which rejects the premise that the students' previous experience in VLE is not determinant for perceiving support from these as facilitators of learning and, therefore, the hypothesis that such perception depends on their previous experiences is accepted.

Table 18. *Previous experiences in virtual learning environments as a determinant of learning facilitator.*

Previous experiences in virtual learning environments	Learning facilitator	%	No Learning facilitator	%	Total	%
Previous experience	129,00	65,48%	68,00	34,52%	197,00	100,00%
No previous experience	31,00	37,80%	51,00	62,20%	82,00	100,00%

According to Table 19, of the 163 students who stated that they had previous experience in virtual learning environments, 61% perceive that the VLE implemented during COVID-19 is a *favorable social environment strategy*, while 39% consider that they *are not a strategy favorable social environment to learning*.

On the other hand, of the 116 students who state that they have *no previous experience* in VLE, only 51% perceive that these environments are a *favorable social environment strategy* against 49% who state that they *are not a favorable social environment strategy to* learning.

Pearson's χ^2 reports a p.value = .115 which does not reject the premise that the student's previous experience in VLE is not determinant for perceiving support from these as a social learning environment and, therefore, the hypothesis that such perception depends on their previous experiences is rejected.

Table 19. *Previous experiences in virtual learning environments as a determinant of social learning environment strategy*

Previous experiences in virtual learning environments	strategy favorable social environment	%	Favorable social environment strategy	%	Total	%
Previous experience	121,00	61,40%	76,00	38,60%	163,00	100,00%
No previous experience	42,00	51,20%	40,00	48,80%	116,00	100,00%

As also stated by Barbrow et al. (1996) and Taberner(2014), besides the learning environment of students, several additional considerations must be examined before implementing an online computer system: students' experiences with and attitudes toward a computer. On the other hand, Landrum (2020) found that prior experience did maintain a significant relationship with satisfaction with online learning, as was found in the present study regarding the perception of VLEs as learning facilitators (Table 18). However, said experience is not determinant to perceive the VLE as a social learning environment (Table 19). Therefore, by having previous experiences, students can perceive the benefits provided by virtual learning environments and establish their relationship with their learning, taking advantage of the resources available in the virtual platforms that the university has implemented.

According to Tables 10 and 14, gender is not a determinant for the perception of virtual environments as learning facilitators and Social Learning Environment Strategy, respectively; nevertheless, according to Keller and Cernerud (2002) "male students were less positive to virtual education ... than other students" (p. 55); however, Hederich et al. (2013) show the male preference for exploring virtual spaces to access information of various kinds, while women resort to this scenario mainly as part of their socialization learning process. In this order of ideas, there has currently been an increase in the demand and enrollment of women in higher education (Coreas-Flores, 2020, 2022) which gives them a different perspective regarding virtual learning environments since they have had to face them as resources to learn and participate in the socialization of their learning. Even though Coreas-Flores

(2022) also found that gender is not a determinant for the selection of a study modality (face-to-face, virtual, or blended) in their academic demand for university degrees, they found that more women than men prefer face-to-face to continue with their higher education studies.

At the moment of perceiving virtual environments as learning facilitators and as social learning environment strategies, gender is not a determining factor, which implies that, currently, both women and men have developed the necessary user experiences to attend to their learning.

According to Aguirre et al. (2015), the incorporation of a virtual classroom allowed students to work collaboratively, with independence of schedules and space, offered more agile communication channels, and contributed to more flexible training during the teaching and learning process, through the realization of non-face-to-face activities; given this, there is a contrast in the results of this study since the perception that students have of VLE as social learning environments is associated with the geographical area but not with gender.

Ramírez-Mera & Barragán López (2018) identified that, for their learning, students seek easy-to-use technological platforms to participate in virtual education; like Ramírez-Mera & Barragán López (2018) the students participating in the present study state that they seek socialization to carry out the teaching-learning process, indicating that they have a favorable social environment during their participation in virtual education.

Given the circumstances under which Internet connectivity works in El Salvador, the rural area lacks a wired connection, so students access their classes and virtual content through a mobile data connection, which makes participation in virtual environments more expensive of learning and makes it difficult to carry out collaborative academic activities (social learning environment).

On the other hand, the geographical areas of the country's political division (Western, Central, and Eastern) have their particularities concerning Internet connectivity because, normally, improvements to the service are implemented by the telephone companies first in the Central area and then they spread to other areas, which can lead to long wait times for subscribers; for example, 5G and fiber optic connectivity is not uniformly available nationwide.

Both connectivity factors make a difference in the perception that students have of VLE as learning facilitators and as a social learning strategy. This implies that not all students are accessing the VLE under the same connectivity conditions, so their learning requires the incorporation of other strategies such as providing connection to HEI services through virtual private networks to favor students who have less connectivity.

This study did not delve into the characterization of the participants beyond gender, geographic area, and age range. Previous experience in virtual education platforms, perception of VLE as learning facilitators, and perception of VLE as a social learning strategy were the product of Exploratory Factor Analysis based on the questions that were originally posed based on student perception indicators regarding virtual learning environments.

The study also does not delve into the characteristics of VLE because the participants were students, who are unaware of the technical details of the platforms that their universities make available to them. Another limitation on this aspect is that teachers and other administrative personnel of the HEI did not participate because only the perception of the students was sought.

Conclusions

- The perception of the support of virtual environments as *facilitators of learning* depends on the student's previous experience in EVA.
- The geographical area in which the participants study is a determining factor for the perception of VLEs as *facilitators of learning*, while it is not for the *previous experience* expressed by the students.
- Students' age is a determining factor for their perception of VLEs as *learning facilitators*, but it is not for *previous experience* in virtual education.
- The perception of *social learning environments* implemented during social distancing is not associated with the student's gender, but it is about the geographic area in which they study.

Recommendations

- Given that *previous experience* is a determining factor for the perception of virtual environments as *learning facilitators*, Salvadoran HEI should include introductory workshops on the use of virtual platforms developed in preparatory courses aimed at new students.

- Taking care of the age groups of the students, HEI must include different academic activities that strengthen learning and, therefore, their perception of VLE as learning facilitators.
- For future research, HEI could investigate the relationship between students' experience in video games and the perception of virtual learning environments as *learning facilitators* and their performance in *collaborative activities*.
- The results of this study also open up opportunities to continue investigating *learning styles* and their relationship with the perception of VLEs as *facilitators of learning*.

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An Examination of the Self-Efficacy Perceptions of Eighth-Grade Students Regarding Computational Thinking Competencies

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ABSTRACT
This study aims to determine the self-efficacy perception levels of secondary school 8th-grade students towards computational thinking skills and examine the self-efficacy perception levels towards computational thinking skills in various variables. The study emphasises that positive attitudes and perceptions are necessary for computational thinking and that people should be willing to learn more about computer science. The study also aims to examine the relationship between students' achievement grades in Mathematics, Science and Technology, English, Turkish Revolution History and Kemalism course and their computational thinking self-efficacy perceptions. Thus, it will be determined that secondary school students' self-efficacy perceptions towards computational thinking skills are related to their achievements in which field type courses.

The research was conducted in a quantitative survey model and single survey design. The Self-Efficacy Perception Scale for Computational Thinking Skills (SCCTS) for secondary school students developed by Gülbahar, Kalelioğlu, and Kert (2018) was put into use. A total of 2247 secondary school 8th grade students, 1147 girls and 1100 boys, studying in Izmir province in the 2018-2019 academic year constitute the study sample. As a result of the analyses, the average self-efficacy perception score of 8th-grade middle school students towards computational thinking skills was above the average at 80.01 points out of 108 total scale points. It was determined that the self-efficacy perceptions of the participants differed in favour of female students according to the gender variable.
Keywords: Computational Thinking, Computer Use, Self-Efficacy, Self-Efficacy Perception, Secondary School Students.

INTRODUCTION

It is widely recognised that the ability to think is considered a crucial skill for human survival. Indeed, one of the most distinguishing features that set humans apart from other living creatures is the process of thinking, which involves various stages of abstract information processing and evaluation, ultimately resulting in measured outcomes. The cognitive abilities that facilitate thinking are known as thinking skills. By honing these skills, greater success can be achieved by effectively leveraging life experiences and intellect (Papert, 1980; Top, 2018). Undeniably, the most critical point in defining thinking skills is that children should be able to recognise how their minds work and express how the connection from abstract to concrete is formed in the process of learning and thinking (Papert, 2007). Therefore, the acquisition of thinking skills in the first years of life will pave the way for individuals to use their minds and thinking abilities in the broader area in the later stages of life.

The pace of transformation in different areas of collectively sustained life in the current era has led to the emergence of several requirements for possessing skills characterised as 21st-century skills. It is vital for the educational factor to come into play in acquiring these skills, which can be listed as decision-making, problem-solving, reasoning, and creative thinking skills, and to ensure the sustainability of the sociological structure. In order to teach the individual how to think, in addition to training on the use of technology, learning environments that will support mental development by directing the individual to think indirectly or directly should be organised (Papert, 2007).

In the digital world, which is growing at an exponential rate every day, computers, mobile and wearable devices have become more accessible and have become indispensable elements in daily life. Manovich (2013) asserts that contemporary society is enveloped by various digital devices, along with the software designed to facilitate their operation. The need for 21st-century individuals to know how technology is produced rather than consuming it and who consume it more consciously is becoming increasingly important every day (Kalelioğlu, 2015). In this process, the transformation experienced across various layers of society has significantly affected both economic

and social life. Today, due to this transformation, individuals from all segments of society are expected to acquire digital literacy skills in tandem with technological advancements (Wing, 2014). While preparing students for life, while ensuring that they acquire these skills, it should be ensured that they have the necessary technology usage competence while simultaneously using these skills in solving the problems they face. Wing (2006) states that individuals should have to use digital technologies by thinking critically about solving the problems they face in all areas of life.

LITERATURE REVIEW

The concept of computational thinking serves as a common framework for problem-solving applicable to humans and machines across various disciplines. Although the term has gained prominence in recent years, its roots can be traced back to the field of computer science as early as the 1960s (Grover & Pea, 2013). Initially introduced by Papert (1996) for employing computers to resolve geometric issues, the concept was later elaborated upon by Wing (2006), who provided a more comprehensive definition. According to Wing, computational thinking involves structuring problems to make them comprehensible to computers, thereby enabling automated problem-solving. Contrary to the notion that this skill is exclusive to professionals in the computer science domain, Wing (2006) posited that computational thinking is a universal competency that all individuals should cultivate. This perspective is corroborated by influential educational organisations such as ISTE, CSTA, and NRC, which endorse Wing's stance and emphasise that computational thinking is among the essential skills for the 21st century that everyone should acquire.

While computational thinking employs mathematical reasoning to design and evaluate complex systems during the problem-solving phase, it also leverages scientific thinking. This enables common approaches to understanding concepts such as computability, intelligence, reason, and human behaviour through engineering (Korkmaz et al., 2015). Building on this, Bundy (2007) expands the scope of computational thinking by stating that it has implications for research across nearly all disciplines in the humanities and natural sciences. Also, Bundy (2007) further notes that using metaphors can facilitate processing large volumes of information, thereby providing a foundation for posing original questions and arriving at unique answers. Transitioning to educational perspectives, ISTE (2015) defines computational thinking as a form of cognitive support for problem-solving through technology. It is stated by Mannila et al. (2014), who emphasise that computational thinking involves the application of computer science concepts and processes during the problem formulation stage. Similarly, Riley and Hunt (2014) highlight the cognitive aspects, characterising computational thinking as the ability to think like a computer scientist when evaluating situations. Also, Sysło and Kwiatkowska (2013) offer a slightly different angle. They define computational thinking as a concept more centred on thinking skills based on computer programming principles rather than computer programming skills per se. Drawing upon these diverse definitions and insights from the literature, it becomes evident that computational thinking is a 21st-century skill. It is a competency that individuals of all ages and backgrounds should possess to enhance their problem-solving abilities and digital competencies.

Since the characteristics of computational thinking include many areas, it is a critical stage to plan and implement some comprehensive processes for teaching it. Making and learning calculations is the beginning of computational thinking for human beings, and it is emphasised that individuals from all age groups should have some basic computational skills (Kalelioğlu et al., 2016). Calculation, arithmetic, symbols, and abstract thinking form the basis of computational work. Computational thinking is a skill used daily while cooking, practising hobbies, and performing physical and mental activities. Wing (2006), while explaining computational thinking skills, used the expression, "Today's ubiquitous information technologies were yesterday's dream, while computational thinking is tomorrow's reality". This statement once again emphasises the importance of teaching computational thinking by teachers in all areas from an early age in terms of the development of individuals.

Although computational thinking is a field that has been studied for many years, it is still necessary to question how to teach and measure it more effectively by defining it and making the necessary plans. It is expected that individuals should have some basic competencies in order to use the information technology tools and applications they need in their work areas (Perković et al., 2010). Computational thinking skills, one of the most prominent of these competencies, foster questioning and thinking in order to obtain results about the solution of the problem while using information technology tools and applications to solve the problems encountered by individuals in their fields of interest (Wing, 2006). Although computer science is one of the concepts that come to mind when it refers to computational thinking skills, it can be said that the field it actually defines has a much broader impact (Üzümcü & Bay, 2018). Computational thinking skill comes to the forefront as a concept that has the capacity to form the basis not only in the field of computer science but also in many other disciplines (CSTA, 2016). Wing (2006) argued that computational thinking should be the basis for humans and machines capable of processing information.

Computational thinking is the systematic organisation of the way and process of thinking humans have in solving the problem (Barr et al., 2011). Wing (2006) pointed out that computational thinking is the use of computer science concepts and techniques such as discrimination, pattern recognition, abstraction and algorithms in solving complex problems. Computational thinking will enable individuals to use digital devices more effectively to solve problems and create solutions quickly and accurately. It is expected that individuals will be able to think computationally to find the answer to the question of how to solve the problems that we may encounter in the future by using today's digital tools (Gülbahar et al., 2018). ISTE and CSTA (2011) argue that individuals with problem-solving and critical thinking skills are more capable of producing solutions to the problems they face in daily life and using digital devices effectively. The acquisition of computational thinking skills is an essential necessity in the digitalising world, which is among the 21st-century skills and allows applying these skills in computer sciences while solving problems by thinking critically.

Wing (2006) argued that due to the problem-solving skill that forms the basis of computational thinking, computational thinking should be possessed by individuals in the information technologies sector and in every layer of social life. These inferences in many fields have brought along question marks about the processes by which computational thinking should be acquired. The lack of a common consensus on the definition of computational thinking skill brings along many problems in its teaching and implementation (Hemmendinger, 2010).

Learning computational thinking skills is seen as a positive and effective indicator of individuals' cognitive development (Liao & Bright, 1991; Papert, 1980). However, with the rapid spread of technology in many areas of life (Howland & Good, 2015), the function of computational thinking is seen as a basic skill that supports the production of technology. Students learn many of the subcomponents of computational thinking through the courses they take in their educational life (Korkmaz et al., 2015). ISTE (2015) emphasises that the primary purpose of computational thinking in teaching is that learners gain computational thinking skills and have the ability to use them in all areas of their lives rather than progressing in the field of computer science. Transforming reasoning and thinking, which are the basic skills used in problem-solving, into a more effective form by using digital devices has become one of the main elements of life and work (Barr et al., 2011). Accordingly, individuals who produce effective solutions by employing computational thinking skills in the new age will be ahead in many areas of life.

When the studies on computational thinking skills are examined in the related literature, some studies show that there is no significant relationship between gender variables (Werner et al., 2012), while other studies show that it has a significant effect on computational thinking skills (Román-González et al., 2017). In addition, Román-González et al. (2017) found that computational thinking skill scores differed in favour of males in their study, while female students made more effort to acquire similar computational thinking skills compared to male students.

Many studies in the literature emphasise that computational thinking can be applied and integrated into mathematics and science (NRC, 2012). According to Perkins and Simmons (1988), similar skills such as reasoning, analytical thinking and problem-solving are needed in teaching science disciplines. Harel and Papert (1991) highlighted that computer science is in high-level interaction with all fields of science. Many studies in the literature also reveal results proving that the sub-dimensions of computational thinking have positive effects on the teaching of many disciplines (Blikstein & Wilensky, 2009; Hambrusch et al., 2009; Kynigos & Grizioti, 2018). Different assessment methods appear as another important condition with appropriate intervals in contexts that focus on the constructivist approach for the acquisition of computational thinking skills (Han & Bhattacharya, 2001).

Sebetci and Aksu (2014) stated that the importance of computer science, which is shaped in a structure based on science, is increasing exponentially in a world digitalising faster every day. The evaluation of computational thinking skills, an abstract concept, is one of the most discussed and agreed-upon points to be done using more than one method (Yeni, 2017). The fact that a consensus has not yet been reached for the definition and sub-dimensions of computational thinking skills is one of the main reasons for this. While measuring computational thinking skills and evaluating through projects or activities, different measurement tools have also been created in which students make self-evaluations. Korkmaz et al. (2016)'s "Computer Thinking Skill Levels Scale", Kukul (2018)'s "Computational Thinking Self-Efficacy Scale", Gülbahar et al. (2018)'s "Self-Efficacy Perception Scale for Computational Thinking Skills" can be shown as examples of these measurement tools.

In the experimental study conducted by Oluk et al. (2018) with 5th-grade students in which they aimed to measure the effect of the Scratch program on algorithm creation and development of computational thinking skills, it was concluded that the algorithm creation and computational thinking skills of the students in the experimental group increased significantly compared to the students in the control group. In the experimental study conducted by

Sırakaya (2019) with 54 Computer Programming students, it was concluded that programming instruction contributed positively to the development of individuals' computational thinking skills. Atman Uslu et al. (2018) conducted a mixed-method study to measure the effect of activities created through Scratch on the computational thinking skills of secondary school students, and at the end of the study, it was stated that students' awareness of computer science increased.

This study aimed to measure the self-efficacy perception levels of the participants towards computational thinking skills and to define the relationship between different variables. Self-efficacy is a concept that includes the use of attitudes, feelings and thoughts that individuals exhibit in order to reach the determined goals and the confidence in having these skills. Accordingly, it directly affects the result of a person's performance in the face of a situation or event (Horzum & Çakır, 2009).

The following problem statement in the study is "What are the self-efficacy perception levels of 8th-grade students towards computational thinking skills?". The sub-problems are listed as follows.

- Do 8th-grade students' self-efficacy perceptions towards computational thinking skills differ according to gender?
- Is there a difference between the self-efficacy perception levels of the participants in the study towards computational thinking skills and their smartphone use status?
- Is there any differentiation between the participants' self-efficacy perception levels towards computational thinking skills and tablet use status?
- Is there a differentiation between the participants' self-efficacy perception levels towards computational thinking skills and their daily computer usage time?
- Is there a relationship between the participants' self-efficacy perception levels towards computational thinking skills and their achievement in Mathematics courses?
- Is there a relationship between the participants' self-efficacy perception levels towards computational thinking skills and their achievement in Science courses?
- Is there a relationship between the participants' self-efficacy perception levels towards computational thinking skills and their achievement in English courses?
- Is there a relationship between the participants' self-efficacy perception levels towards computational thinking skills and their achievement in Turkish Revolution History and Kemalism course?

METHODOLOGY

Research Design

This study, which aims to determine 8th-grade students' self-efficacy perception levels towards computational thinking skills and to examine the relationship between various variables, was conducted in a quantitative research design. The quantitative research methods aim to reach statistical results by obtaining accurate and reliable measurements through collecting and analysing structured and numerically representable data (Goertzen, 2017). Türnüklü (2001) defined the primary purpose of quantitative research as producing generalisable information explaining cause-and-effect relationships. The research design was determined as a survey model. Survey research is characterised as studies conducted on large samples to determine the views of the participants on events or issues or their characteristics such as interests, skills, abilities and attitudes (Büyüköztürk et al., 2008). In addition, a single screening model was used to determine the participants' gender, smartphone use, tablet use, and daily technological device usage time, and a relational screening model was used to analyse their self-efficacy perceptions towards computational thinking skills according to various variables.

Population and Sample

The population of the study in the 2018-2019 academic year consists of 43,914 secondary school 8th-grade students studying in public schools in Izmir, Turkey. The stratified sampling method, one of the random sampling methods, was used to determine the study sample. Stratified sampling aims to represent the subgroups in the population in the sample in proportion to their weight in the population, and the process of obtaining units from sub-populations is carried out by simple, unbiased sampling (Büyüköztürk et al., 2012). Stratified sampling aims to increase the representativeness of the population by reducing sampling error (Baltacı, 2018).

In stratified sampling, the population based on a descriptive variable should be divided into two or more strata (Bernard, 2017). In the study, since the relationship between the self-efficacy perceptions of secondary school 8th-grade students towards computational thinking skills and their scores in Mathematics, Science and Technology, English and Turkish Revolution History and Kemalism courses will be analysed, the scores of the Transition from Basic Education to Secondary Education (TEOG) exam, which is an exam consisting of the average of these courses, were selected as the defining variable in the sampling.

The average scores of 8th-grade students who sat for the April 2017 TEOG exam were used to determine the schools to be selected in the study's sampling. According to the results of the April 2017 TEOG exam, firstly, the average achievement of each district was calculated, and according to the district achievements, 30 districts in Izmir province were sorted from higher to lower in Table 3.1. The districts were divided into 3 levels as groups of 10, considering their achievement averages. In the literature, it is suggested that it is necessary to reach 381 samples in a population of 50,000 people for a 95% confidence level to determine the representativeness of the population (Yazıcıoğlu & Erdoğan, 2004). Büyüköztürk (2012) emphasised that in multivariate studies (including multiple regression analyses in this context), the sample size to be reached should be 10 times or more the number of variables in the study. Therefore, in the study, it was aimed to reach 30 schools by selecting 10 districts and 3 schools from each district and a total of 3000 students by selecting 100 students from each school, and data were collected from 2354 students. The necessary permission for data collection was obtained from the Izmir Provincial Directorate of National Education.

In the selection of the districts, the ones where the implementation of the scales would be easier were selected. While selecting the schools, the schools in the districts were divided into 3 categories according to their April 2017 TEOG score averages, ranked from largest to smallest. One school was selected from each of the categories, and the scale was applied to all 8th-grade students in the school. Following the application, 2354 scales were returned as applied.

In the study, there are 9 different independent variables, and these are gender, smartphone use, tablet use, daily computer usage time, achievement in Mathematics course, achievement in Science and Technology course, achievement in English course and achievement in Turkish Revolution History and Kemalism course. Büyüköztürk et al. (2012) suggest that 90 or more data to be selected in research with 9 variables is a significant criterion in representing the population. In this respect, it was assumed that collecting a total of 2354 scale data from the population determined as a result of the research was highly representative of the population. The applied forms were analysed, and the forms in which more than 10% of the total number of items in the scale were not completed were excluded from the research. When the forms were analysed, 107 forms that did not meet this criterion were not processed, and the data of the study were formed with the data of 2,247 students in total. Table 1 presents the number of students to whom the scale was applied in terms of levels.

Table 1. Number of students comprising the sample at each level

Level	Number of Students
Level 1	709
Level 2	989
Level 3	656

The numbers of the students in the sample regarding the gender variable are given in Table 2.

Table 2. Number of students in the sample regarding gender variable

Gender	Number of Students	%
Female	1147	51,04 %
Male	1100	48,96 %

The number of students in the sample regarding the school type variable is given in Table 3.

Table 3. Number of students in the sample and in secondary schools in Turkey regarding the gender variable

School Type	Number of Students	%	Number of Students in Türkiye	%
Secondary School	2094	93.19 %	4.263.108	85.55 %
İmam Hatip Secondary School	109	4.85 %	641.593	12.87 %
Regional Primary Boarding School	44	1.96 %	78.262	1.57 %

Total	2247	100 %	4.982.963	100 %

Data Collection Tools

In the study, the "Self-Efficacy Perception Scale for Computational Thinking Skills" (SEPSCTS) developed by Gülbahar et al. (2018) for secondary school students was used. There are 36 questions on the whole scale, which has 5 sub-dimensions in total. The questions were graded as "Yes", "Partially", and "No" on a 3-point Likert scale. The total reliability coefficient of the scale was .943. The values of the sub-dimensions of the scale are given in Table 4.

Table 4. Internal consistency coefficients related to the sub-dimensions of the Self-Efficacy Perception Scale for Computational Thinking Skills (SEPSCTS)

Number	Sub-dimensions	Item Number	Cronbach's Alpha Value
1	Algorithm Design Competence	9	.930
2	Problem-Solving Competence	10	.880
3	Data Processing Competence	7	.856
4	Basic Programming Competence	5	.838
5	Self-confidence Competence	5	.762
	The whole Scale	36	.943

When the internal consistency coefficients of the dimensions were examined, it was seen that they were between .930 and .762. Internal consistency coefficients between .70 and .90 are defined as high-reliability values and values above these values are defined as excellent reliability values (Hinton et al., 2014). In this context, it can be concluded that the reliability values of the general structure of the scale and the sub-factors of the scale are sufficient.

It can be said that gender and education level variables are among the important variables for the acquisition and development of computational thinking skills (Durak & Sarıtepeci, 2018). In the literature, studies prove a relationship between gender and self-efficacy perception level, programming, computational thinking skill level and development (Lee et al., 2014; Durak & Sarıtepeci, 2018). Considering this point, while investigating the participants' self-efficacy perception level of computational thinking skills, it was aimed to reveal the relationship with the gender variable.

ISTE (2011) and NRC (2012) suggest that the only way to demonstrate computational thinking skills is not to use digital devices and that this skill can be measured with different applications. However, studies in the literature show that individuals' interactions with technology are essential in terms of their reflection on computational thinking skills (Kalelioğlu, 2015; Top, 2018; Gülbahar et al., 2018). As a result, it may be a possible situation that students' experiences of using information technologies affect their computational thinking skills. There are studies that coding education, which has come to the fore in recent years, contributes positively to the acquisition and development of computational thinking skills (Korkmaz et al., 2015; Lye & Koh, 2014; Sarıtepeci & Durak, 2017). Due to these results, items for devices such as computers and tablets were added to determine the level of the relationship between the participants' use of digital tools, their daily usage time and their self-efficacy perception levels towards computational thinking skills.

There is a strong connection between science and computer science, which is the main element of computational thinking (Perkins & Simmons, 1988; Wing, 2006; Bundy, 2007; Barr & Stephenson, 2011). Wing (2006, 2014) emphasised that computational thinking is a skill needed by individuals from all age groups and from all fields. Accordingly, it was aimed to determine the relationship between the courses in the fields of science and social sciences and the self-efficacy perceptions towards computational thinking skills of the participants in the study and to determine the fields in which the relationship is found. As a result, while preparing the research form, items including gender, device ownership, daily computer usage time, first semester grades of Mathematics, Science and Technology, English, Turkish Revolution History and Kemalism course, and Music and Visual Arts courses were added and distributed as a printed form. From the 2354 scales applied, the forms filled in below the specified criterion were removed, and analyses were made with 2247 forms.

Data Analysis

In the study, a T-test was used to determine whether the participants' self-efficacy perceptions towards computational thinking skills differed significantly according to gender, smartphone, and tablet use. Pearson Product Moment Correlation analysis was used to determine the relationship between the participants' self-

efficacy perceptions towards computational thinking skills and daily technological device usage time, Mathematics, Science and Technology, English, Turkish Revolution History and Kemalism, Visual Arts and Music course scores.

RESULTS

In the study, 8th-grade students' self-efficacy perceptions towards computational thinking skills were analysed in terms of gender, technological device use, technological device usage time and various courses. The position of the relationship between the measured variables and students' self-efficacy perceptions towards computational thinking skills in the literature was emphasised, and the results of the previous studies were evaluated and reported.

After the necessary steps were followed during the research, a data set was created with 2247 scales and analyses were made. As a result of the analysis, the mean score of the sample of 8th-grade students' perceptions of computational thinking was determined as 80.01, and it was concluded that it was above the average. According to the decision of the Board of Education and Instruction dated 28/05/2013 and numbered 22, the Information Technologies and Software (ITY) course is taught as a compulsory course for 2 hours per week in the 5th and 6th grades and as an elective course for 2 hours per week in the 7th and 8th grades. ICT course is included in the curriculum as a course in which coding and the use of digital devices are mainly covered. Coding education comes to the forefront by enabling students to plan the steps for solving problems by utilising their computational thinking skills and gaining the skills to use them at the necessary stages. It can be concluded that the fact that the students have taken ICT courses starting from the 5th grade is one of the crucial factors in the mean self-efficacy perception of the students who have reached the 8th grade towards computational thinking skills.

Considering the factors of the scale in Table 5, it can be concluded that the self-efficacy perceptions of the sample towards algorithm design competence, problem-solving competence, data processing competence and basic programming competence are above average, and their self-efficacy perceptions towards self-confidence competence are high.

Table5. Mean and standard deviation values of scales and factors

Scale	N	X̄	Standard Deviation	Minimum	Maximum
Algorithm Design Competence (Factor 1)	2247	16.93	5.638	9	27
Problem-Solving Competence (Factor 2)	2247	24.13	4.406	10	30
Data Processing Competence (Factor 3)	2247	16.42	3.894	7	21
Basic Programming Competence (Factor 4)	2247	10.37	3.074	5	15
Self-confidence Competence (Factor 5)	2247	12.14	2.581	5	15
Total Scale	2247	80.01	14.854	36	108

51.04% (1147) of the participants were female students and 48.96% (1100) were male students. It was aimed to examine the differentiation of self-efficacy perceptions towards computational thinking skills according to gender by independent samples T-test.

Table 6. T-test results of SEPSCTS and factor scores regarding gender variable

Scale	Gender	N	X̄	SS	SD	t	p
F1	Female	1147	16.95	5.585	2245	0.17	.569
	Male	1100	16.90	5.695			
F2	Female	1147	24.52	4.151	2245	4.283	.000
	Male	1100	23.72	4.624			
F3	Female	1147	16.54	3.752	2245	1.453	.003

	Male	1100	16.30	4.034			
F4	Female	1147	10.14	3.000	2245	-3.616	.077
	Male	1100	10.61	3.134			
F5	Female	1147	12.24	2.527	2245	1.992	.063
	Male	1100	12.03	2.633			
Total Scale	Female	1147	80.39	14.283	2245	1.237	.021
	Male	1100	79.61	15.424			

Table 6 shows that participants' self-efficacy perceptions towards computational thinking skills differed significantly according to gender (t=1.237, p= 0.021). It was concluded that self-efficacy perceptions of female students ($\bar{X}$ =80.39, p=14.283) were higher than male students ($\bar{X}$ =79.61, p=15.424).

Table 6 shows that problem-solving competence (Factor 2) and data processing competence (Factor 3) differed significantly according to gender variable, and there was no significant difference in other factors. It is seen that the problem-solving competencies of the participants (Factor 2) differed significantly according to gender (t=4,283, p= 0.000). It was determined that the problem-solving competencies of female students ($\bar{X}$=24,52, s=4,151) were higher than those of male students ($\bar{X}$=23,72, s=4,624). This finding can be interpreted as there is a significant difference between the problem-solving competence of 8th-grade secondary school students and gender with a low difference. The data processing competencies of the participants (Factor 3) differ significantly according to gender (t=1.453, p=0.003). It was concluded that the data processing competencies of female students ($\bar{X}$=16.54, s=3.752) were higher than male students ($\bar{X}$=16.3, s=4.034). Considering this result, it can be concluded that there is a significant difference between the data processing competence of 8th-grade students and their gender.

A T-test was conducted to examine the difference in self-efficacy perceptions towards computational thinking skills according to the participants' smartphone use status. It was found that 79.88% of the participants had a smartphone, while 20.12% did not have a smartphone. The results of the T-test are given in Table 7.

Table 7. T-test results of SEPSCTS scores and factor scores regarding smartphone use

Scale	Smartphone Use	N	$\bar{X}$	SS	SD	t	p
F1	No	452	17.27	5.424	2245	1.455	0.084
	Yes	1795	16.84	5.689			
F2	No	452	24.13	4.288	2245	0.017	0.077
	Yes	1795	24.13	4.436			
F3	No	452	16.13	3.960	2245	-1.765	0.315
	Yes	1795	16.50	3.875			
F4	No	452	10.38	2.878	2245	0.055	0.006
	Yes	1795	10.37	3.123			
F5	No	452	12.08	2.495	2245	-0.537	0.540
	Yes	1795	12.15	2.602			
Total	No	452	80.00	14.415	2245	-0.022	0.435
	Yes	1795	80.01	14.967			

Table 7 shows that the participants' self-efficacy perceptions towards computational thinking skills did not differ significantly according to their smartphone use status (t=-0.022, p= 0.435). This result shows no significant difference between the participants' self-efficacy perceptions towards computational thinking skills and their smartphone use. When the factors in the scale are examined, it is concluded that there is a significant difference between basic programming competence (factor 4) and smartphone use (t=0.055, p=0.006).

Independent samples T-test was conducted to determine the difference in the participants' self-efficacy perceptions towards computational thinking skills according to their tablet use. While it was determined that 42.23% of the participants had a tablet, 57.77% of them did not have a tablet. The T-test results of self-efficacy perception scale scores for computational thinking skills according to tablet use are presented in Table 8.

Table 8. T-test results of SEPSCTS scores and factor scores according to tablet ownership

Scale	Smartphone Use	N	X̄	SS	SD	t	p
F1	No	1298	16.62	5.496	2245	-3.005	0.057
	Yes	949	17.34				
F2	No	1298	23.87	4.486	2245	-3.304	0.100
	Yes	949	24.49				
F3	No	1298	16.23	3.878	2245	-2.801	0.892
	Yes	949	16.69				
F4	No	1298	10.25	3.052	2245	-2.194	0.280
	Yes	949	10.54				
F5	No	1298	12.02	2.532	2245	-2.486	0.125
	Yes	949	12.3				
Total	No	1298	79.01	14.618	2245	-3.743	0.164
	Yes	949	81.38				

According to Table 8, self-efficacy perceptions towards computational thinking skills do not show a significant difference according to tablet usage (t=-3.743, p=0.164). This finding can be interpreted as that there is no significant difference between 8th-grade secondary school students' self-efficacy perceptions towards computational thinking skills and their tablet use. When the factors of the scale are analysed, it is seen that there is no significant difference between the factors of the scale and tablet use.

One-factor analysis of variance (One-Way ANOVA) was performed to examine whether there is a difference in the self-efficacy perceptions of secondary school 8th-grade students towards computational thinking skills according to their daily computer usage hours. During the analysis of variance, the grouping of the daily computer usage hours of the participants in the study was made as given in Table 9.

Table 9. Grouping the daily computer usage time of the participants in the study

Usage time	Number of Students	%
0 to 1 hour	1232	54.82
1 to 3 hours	663	29.50
3 to 5 hours	207	9.21
5 hours and over	145	6.47
Total	2247	100

The descriptive statistics of the scores of 8th-grade secondary school students' self-efficacy perceptions towards computational thinking skills according to the duration of daily computer use are presented in Table 10.

Table 10. Descriptive statistics of the scores of the participants regarding SEPSCTS according to the duration of daily computer usage

Scale	Daily Technology Usage Time	N	X̄	SS
SEPSCTS	0 to 1 hour	1232	79.89	14.740
	1 to 3 hours	663	80.66	14.674
	3 to 5 hours	207	78.03	14.905
	5 hours and over	145	80.89	16.370
	Total	2247	80.01	14.854

ANOVA test results of students' self-efficacy perceptions towards computational thinking skills regarding their daily computer usage time are shown in Table 11.

Table 11. Homogeneity of variance test statistics of SEPSCTS scores of the participants regarding the duration of computer usage

	Levene Statistic	df1	df2	Sig.
F1	1.235	3	2243	0.295
F2	0.055	3	2243	0.983
F3	0.361	3	2243	0.781
F4	1.494	3	2243	0.214
F5	1.209	3	2243	0.305
SCALE	1.129	3	2243	0.336

According to Table 11, the significance value p= 0.336 at a 95% confidence interval and since it is more than 0.05, the variances of the groups are homogeneous. Subsequently, a one-way analysis of variance was performed. Table 12 presents the results of the one-way variance analysis of the groups.

Table 12. One-way variance analysis of the participants" self-efficacy perception scores for computational thinking skills regarding their daily computer usage time scores

	Source of Variance	Sum of squares	df	Mean Squares	F	Sig.
F1	Between groups	113.599	3	37.866	1.192	0.311
	Within groups	71279.400	2243	31.779		
	Total	71393.439	2246			
F2	Between groups	95.222	3	31.741	1.637	0.179
	Within groups	43502.092	2243	19.395		
	Total	43597.314	2246			
F3	Between groups	105.366	3	35.122	2.321	0.073
	Within groups	33947.295	2243	15.135		
	Total	34052.660	2246			
F4	Between groups	56.852	3	18.951	2.008	0.111
	Within groups	21171.599	2243	9.439		
	Total	21228.451	2246			
F5	Between groups	30.302	3	10.101	1.518	0.208
	Within groups	14928.93	2243	6.656		
	Total	14959.232	2246			
Total Scale	Between groups	1226.658	3	408.886	1.855	0.135
	Within groups	494360.145	2243	220.401		
	Total	495586.804	2246			

The results of the significance analysis of the participants' self-efficacy perception scores for computational thinking skills according to their daily computer usage time are given in Table 12. The analysis results show no significant difference in terms of self-efficacy perception towards computational thinking skills according to daily technological device usage time scores (p=0.135).

The Pearson Product Moment Correlation analysis was carried out to determine the relationship between the scores of the scale and sub-factors of the participants' self-efficacy perceptions towards computational thinking skills and their Mathematics course scores. Table 13 presents the correlation analysis results between the scale scores and sub-factors of the participants' self-efficacy perceptions towards computational thinking skills and their Mathematics course scores.

Table 13. The results of the correlation analysis between the participants' self-efficacy perceptions regarding computational thinking skills and their Mathematics course scores

		Mathematics Course Achievement	F1	F2	F3	F4	F5	Total Scale
Mathematics Course Achievement	r	1	.157**	.362**	.241**	.023	.253**	.279**
	p		.000	.000	.000	.284	.000	.000
	N	2247	2247	2247	2247	2247	2247	2247

According to the results of the analyses, a statistically significant positive weak relationship was found between the participants' self-efficacy perception level scores for computational skills and their Mathematics course scores at p<.05 level (r= .279; p<.05). When the sub-factors of the scale were examined, no statistically significant relationship was found between the perception level scores in the sub-factors of algorithm designing competence (r= .157; p<.05) and basic programming competence (r= .023; p<.05) and Mathematics course scores. A statistically weak relationship was found between perception level scores and Mathematics course scores in the sub-factors of problem solving competence (r= .362; p<.05), data processing competence (r= .241; p<.05) and self-confidence competence (r= .253; p<.05).

A review of the literature shows that there are studies showing that attitude towards mathematics course and academic achievement in mathematics course has a positive effect on computational thinking skills (Moursund, 2006; Akçay, 2009; Burke & Kafai, 2010; Kalelioğlu & Gülbahar, 2014; Kazakoff, 2015). Lewis and Shah (2012) found a significant correlation between the mathematics and programming tests they applied at the end of a 36-hour study with 47 6th-grade students in 2011, using Snap, Logo, and mainly Scratch.

It was emphasised that computational thinking has always been a part of mathematics and mathematics education. In terms of mathematics education, computational thinking should be integrated into mathematical thinking, which is an essential component that affects mathematics achievement. Wing (2006) stated that computational thinking is also based on mathematical thinking, considering that the foundations of all sciences are based on mathematics due to the nature of computer science.

The Pearson Product Moment Correlation analysis was performed to determine the relationship between the scores of the scale and sub-factors of the self-efficacy perceptions of the participants towards computational thinking skills and their Science and Technology course scores. Table 14 shows the results of the correlation analysis.

Tablo 14. Correlation analysis results of the participants' self-efficacy perception scores for computational thinking skills regarding Science and Technology course scores

		Science and Technology Course Achievement	F1	F2	F3	F4	F5	Total Scale
Science and Technology Course Achievement	r	1	.171**	.349**	.274**	.036	.247**	.291**
	p		.000	.000	.000	.088	.000	.000
	N	2247	2247	2247	2247	2247	2247	2247

The results of the analyses reveal that there is a statistically significant weak positive relationship between the participants' self-efficacy perception level scores for computational skills and their Science and Technology course scores at p<.05 level (r= .291; p<.05). Considering the sub-factors of the scale, no relationship was found between the scores of the algorithm designing competence (r= .171; p<.05) and basic programming competence (r= .036; p<.05) sub-factors and the scores of the Science and Technology course. A weak relationship was found between the scores of the other sub-factors, namely problem-solving competence (r= .349; p<.05), data processing competence (r= .274; p<.05) and self-confidence competence (r= .247; p<.05), and the Science and Technology course scores.

Even though computational thinking is considered as a concept associated with computer science, it has an organic and strong connection with science and mathematics (Bundy, 2007). Computational thinking plays an essential role in the development of skills such as problem-solving, abstraction, algorithmic thinking, creative thinking, and

logical thinking, which are among the basic concepts of computer science and are widely used in mathematics and science (Barr & Stephenson, 2011).

The Ministry of National Education emphasises that science and technology literacy is an important factor in social development by stating that it plays a vital role in students' analytical thinking and questioning, making the right decisions about solving problems and becoming self-confident individuals who can establish correct interactions (MoNE, 2013). The utilisation of interdisciplinary approaches in education stands out as an essential issue that needs to be implemented among educators, and breakthroughs are being made in its implementation (Moye, 2011). The results of the analyses show that there is a positive relationship between the computational thinking skills and sub-factors of Science and Technology teaching and course success. In this sense, in preparing the Science and Technology course curriculum, the selection of content that will increase students' computational thinking skills may positively affect their course success.

The Pearson Product Moment Correlation analysis was performed to determine the relationship between the scores of the scale and sub-factors of the participants' self-efficacy perceptions towards computational thinking skills and their English course scores. Table 15 shows the results of the correlation analysis.

Table 15. Correlation analysis results of the participants' self-efficacy perception scores for computational thinking skills regarding their English course scores

		English Course Achievement	F1	F2	F3	F4	F5	Total Scale
English Course Achievement	r	1	.154**	.297**	.244**	.021	.234**	.258**
	p		.000	.000	.000	.322	.000	.000
	N	2247	2247	2247	2247	2247	2247	2247

The results of the analyses show that there is a statistically significant positive relationship between the participants' self-efficacy perception level scores for computational skills and their English course scores at p<.05 level (r= .258; p<.05). When the sub-factors of the scale were analysed, no statistically significant relationship was found between the perception level scores and English course scores in the sub-factors of algorithm designing competence (r= .154; p<.05) and basic programming competence (r= .021; p<.05). In the other sub-factors of problem-solving competence (r= .297; p<.05), data processing competence (r= .244; p<.05) and self-confidence competence (r= .234; p<.05), a statistically weak relationship was found between the perception level scores and English course scores.

Pearson Product Moment Correlation analysis was performed to determine the relationship between the scores of the scale and sub-factors of the self-efficacy perceptions of the participants towards computational thinking skills and Turkish Revolution History and Kemalism course scores. The results of the correlation analysis are given in Table 16.

Table 16. *Correlation analysis results of the participants' self-efficacy perception scores for computational thinking skills according to their scores in Turkish Revolution History and Kemalism course*

		Turkish Revolution History and Kemalism Course Achievement	F1	F2	F3	F4	F5	Total Scale
Turkish Revolution History and Kemalism Course Achievement	r	1	.193**	.307**	.257**	.019	.222**	.274**
	p		.000	.000	.000	.370	.000	.000
	N	2247	2247	2247	2247	2247	2247	2247

The results of the analyses show that there is a statistically significant weak positive relationship at p<.05 level between the participants' self-efficacy perception level scores for computational skills and their Turkish

Revolution History and Kemalism course scores (r= .274; p<.05). When the sub-factors of the scale were analysed, no statistically significant relationship was found between the perception level scores in the sub-factors of algorithm designing competence (r= .193; p<.05) and basic programming competence (r= .019; p<.05) and Turkish Revolution History and Kemalism course scores. In the other sub-factors of problem-solving competence (r= .307; p<.05), data processing competence (r= .257; p<.05) and self-confidence competence (r= .222; p<.05), a statistically weak relationship was found between the perception level scores and Turkish Revolution History and Kemalism course scores.

DISCUSSION

The relationship between the self-efficacy perceptions of 8th-grade students towards computational thinking skills and different variables was analysed, and a study was conducted to reveal the variables showing differences. According to the results of the analysis, the mean score of self-efficacy towards computational thinking skills of the sample of 8th-grade students was found to be 80.01, and it was concluded that it was above the mean.

Analysing the mean scores of the participants according to the sub-factors of the scale, it was determined that the mean score of algorithm designing competence was 16.93, the mean score of problem-solving competence was 24.13, the mean score of data processing competence was 16.42, the mean score of basic programming competence was 10.37, and the mean score of self-confidence competence was 12.14. These results suggest that 8th-grade students' self-efficacy perceptions towards computational thinking skills and scale sub-factors are above average. Kukul (2018) concluded that there was no significant difference between the computational thinking skills and self-efficacy of 5th-grade students in his study in which programming instruction was differentiated. Experience is the most crucial factor that increases an individual's self-efficacy perception. Thinking skills are among the skills that are presented and developed in line with the needs of students through activities in which the content is enriched and created (Güneş, 2012). In this regard, it can be said that the implementation of content designed to gain computational thinking skills to increase individuals' self-efficacy in the education and training process is of critical importance at this point.

According to the 8th-grade students' gender variable, it was concluded that their self-efficacy perceptions towards computational thinking skills differed. The self-efficacy perception score for computational thinking skills of female students was found to be 80.39 and 79.61 for male students, and it was concluded that there was a slight difference in favour of female students. It can be said that the 8th-grade students who constitute the sample of this study are adolescents due to their age. In Türkiye, adolescence starts at the ages of 10-12 for girls and 12-14 for boys (Yavuzer, 1994). The development of abstract thinking ability in adolescents has a vital role in increasing problem-solving ability and academic success (Doğan, 2007). From this point of view, it can be said that there is a positive result in the gender variable due to the earlier development of abstract thinking skills of female students who enter adolescence earlier. However, it was concluded that the emergence of different results in the context of gender variables in the studies conducted in the measurement of computational thinking skills was due to the lack of sufficient saturation of the studies conducted on this subject in the relevant literature.

When the sub-factors of the scale were examined in terms of gender variable, it was concluded that the dimensions of problem-solving competence (Factor 2) and data processing competence (Factor 3) showed a significant difference in favour of female students in terms of gender variable. The mean score of problem-solving competence was found to be 24.52 for female students and 23.72 for male students. This result shows that problem-solving competence differs with a low difference in favour of female students in terms of gender variables in 8th-grade students. The mean score of data processing competence was 16.54 for female students and 16.30 for male students. This result shows that problem-solving competence differs with a low difference in favour of female students regarding gender variables in 8th-grade students. Coding education aims to define the current problem and organise the data by dividing the problem into parts and translating them into codes that the computer can analyse (Saeli, 2012). Since data processing is among the steps of problem-solving, it can be concluded that individuals with problem-solving competence also have high data processing skills.

Gender roles of individuals have an effect on technology attitudes (Stein & Nickerson, 2004). In the literature, different findings have emerged in many studies on the relationship between gender and self-efficacy and what kind of changes occur in the teaching process during the acquisition of programming and coding skills (Aşkar & Davenport, 2009; Crews & Butterfield, 2003; Werner et al., 2012; Roman-Gonzalez et al., 2017; Atmatzidou & Demetriadis, 2016). In the determination of the relationship between individuals' self-efficacy perceptions towards computational thinking skills and gender, it is suggested that studying with samples selected from different age groups and grade levels will reveal effective results.

It was found that the participants' self-efficacy perceptions towards computational thinking skills did not differ according to smartphone use. When the sub-factors of the scale were examined in terms of smartphone use variable, it was concluded that there was a significant difference in basic programming competence (Factor 4). As a result, it can be concluded that there is a significant relationship between 8th-grade students' basic programming competencies and smartphone use.

When the relationship between the participants' self-efficacy perceptions towards computational thinking skills and tablet use was examined, it was concluded that there was no significant differentiation. It was also found that there was no significant differentiation between the factors of the scale and tablet use. Accordingly, it is concluded that there is no relationship between 8th-grade secondary school students' self-efficacy perceptions towards computational thinking skills and tablet use.

When the relationship between the participants' self-efficacy perceptions towards computational thinking skills and their daily computer usage time was examined, it was concluded that there was no significant differentiation. Accordingly, it is concluded that there is no relationship between middle school 8th-grade students' self-efficacy perceptions towards computational thinking skills and their daily computer usage time.

As a result of the correlation analysis between the participants' self-efficacy perceptions towards computational thinking skills and their Mathematics course scores, a significant weak positive relationship was found. As a result of the correlation analysis between the sub-factors of the scale and the participants' Mathematics course scores, it was concluded that there was a weak positive relationship between the Mathematics course scores and the sub-factors of Problem-solving competence (Factor 2), Data processing competence (Factor 3) and "Self-confidence competence (Factor 5).

A significant weak positive relationship was found as a result of the correlation analysis between the participants' self-efficacy perceptions towards computational thinking skills and the Science and Technology course scores. When the correlation analysis between the sub-factors of the scale and the Science and Technology course scores of the participants was analysed, it was found that there was a weak positive relationship between the Science and Technology course scores and the sub-factors of Problem-solving competence (Factor 2), Data processing competence (Factor 3) and Self-confidence competence (Factor 5).

As a result of the correlation analysis between the participants' self-efficacy perceptions towards computational thinking skills and their English course scores, a significant weak positive relationship was found. When the correlation analysis between the sub-factors of the scale and the participants' English course scores was analysed, it was found that there was a weak positive relationship between the English course scores and the sub-factors of Problem-solving competence (Factor 2), Data processing competence (Factor 3) and Self-confidence competence (Factor 5).

As a result of the correlation analysis between the participants' self-efficacy perceptions towards computational thinking skills and the scores of the Turkish Revolution History and Kemalism course, a significant weak positive relationship was found. When the correlation analysis was analysed according to the sub-factors of the scale and the scores of the participants in the Turkish Revolution History and Kemalism course, it was found that there was a weak positive relationship between the scores of the Turkish Revolution History and Kemalism course and the sub-factors of problem-solving competence (Factor 2), data processing competence (Factor 3) and self-confidence competence (Factor 5).

CONCLUSION AND RECOMMENDATIONS

It was concluded that there was a relationship between the participants' self-efficacy perceptions towards computational thinking skills in numerical courses such as Mathematics and Science and Technology, which are considered as the basis of computer science, and verbal courses such as Turkish Revolution History and Kemalism, and English, which emphasise language skills. While this result supports that computational thinking skill is a skill related to mental abilities, it plays an important role in the conceptualisation of computational thinking skills by explaining its connection with verbal skills as well as numerical skills (Brennan & Resnick, 2012; Lye & Koh, 2014; Wing, 2006, 2008).

Although computational thinking is usually defined in terms of computer science concepts, the working systems of computers contribute greatly to individuals' problem-solving skills in their daily lives. Therefore, the people who should have computational thinking skills should not only be professionals working in computer science but also individuals from all segments of society (Wing, 2006).

Teaching different ways of thinking will contribute to the development of individuals' learning skills and increase their analytical thinking and problem-solving competencies (Cohen, 1998). For this reason, it is thought that teachers who design and implement learning environments should plan, design, implement and evaluate in line with students' acquisition of these competencies.

In the Tenth Development Plan (2014), the individual profile planned to be raised with the current education system is defined as productive and happy individuals who have developed thinking, perception and problem-solving skills, who have internalised democratic values and national culture, who are open to sharing and communication, who have strong artistic and aesthetic feelings, who have self-confidence and a sense of responsibility, entrepreneurship and innovation, who are prone to the use and production of science and technology, and who are equipped with the basic knowledge and skills required by the information society. The structure of computational thinking skills, which includes problem-solving, technology use, thinking and productivity, supports this definition. With its 21st-century skills, computational thinking skill has taken its place among the skills that individuals who will form the future should have first.

The PISA exam, which is implemented by the Organisation for Economic Cooperation and Development (OECD) and aims to evaluate International Student Achievement, has been held in our country since 2003. PISA is a comprehensive international assessment project that measures whether 15-year-old students in OECD countries have acquired the necessary life skills at the end of compulsory education. The primary purpose of this exam is to measure maths and science literacy levels and problem-solving skills. According to the 2015 PISA exam results, Turkey ranked 52nd among 72 countries. Taş et al. (2016) stated that gains such as solving problems, creating and applying algorithms, using and interpreting data, and using abstract content are among the competencies of the PISA exam. Providing students with computational thinking skills will be influential in their success in the PISA exam.

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Comparison of FMS Tests and Digital Goniometer Measurement Values in U15 Age Category Football Players in TRNC

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ABSTRACT
This study aims to evaluate the physical abilities of U15 age category football players in the Turkish Republic of Northern Cyprus. The Functional Movement Screening (FMS) tests and digital goniometer measurement values of the football players who voluntarily participated in the study and did not have any injury history were compared. The findings show that there are statistically significant differences between the angles of movement such as hip flexion, extension, abduction, internal rotation and external rotation in various movement tests (deep squat, high stepping, single line lunge, shoulder mobility, active straight leg lift, trunk stability push-ups, rotation stability).

These results reveal that football players may vary in certain movements according to their positions and physical abilities, and these differences may have an impact on their performance. The research provides an important basis for understanding the physical characteristics of young footballers and optimizing their training programs accordingly. Such studies play a critical role in developing more personalized training and rehabilitation strategies for athletes to improve their performance and reduce the risk of injury.
Keywords: U15 years, Functional Movement Screening, Goniometry.

1. INTRODUCTION

Physical activity has major effects on health and performance. Various evaluation methods are used by sports physicians, physiotherapists, and coaches to improve the performance of athletes, reduce the risk of injury, and prevent potential health problems (Abdollahzade et al., 2017). Among these methods, Functional Movement Screening (FMS) and digital goniometer measurement are widely preferred tools for assessing athletes' motion quality and functional abilities. FMS helps athletes create personalized training programs by identifying their basic movement patterns and weak points, while the digital goniometer is used to detect movement limitations and imbalances by precisely measuring joint range of motion. These assessment methods help athletes optimize their performance and minimize their risk of injury (Sahin et al., 2018).

Functional Movement Screening (FMS) is an assessment protocol developed by Gray Cook and Lee Burton. Basically, FMS; It is a method used to assess an individual's movement quality, symmetry, balance, and flexibility. The test includes seven different movement patterns and determines whether each movement is performed correctly. The main goal of FMS is to reduce the risk of injury and improve sports performance by identifying potential movement defects (Tejani et al., 2019).

Digital goniometers, on the other hand, are sensitive devices used to measure joint angles of motion. Unlike traditional handheld goniometers, digital goniometers provide more accurate measurements and allow for easier analysis by recording data digitally. Thanks to these features, digital goniometers are widely preferred for objectively assessing joint angles of motion (Yoon et al., 2018).

1.1. Problem

FMS tests are a battery of tests used to evaluate athletes' mobility abilities and determine possible injury risks. Implementing FMS tests for footballers can help them improve their performance and prevent injuries. FMS tests are an important tool used to assess football players' mobility and injury risks. The first test, the Deep Squat, assesses footballers' hip, knee and ankle mobility, while also measuring upper body and spine stability.

The Hurdle Step test tests hip, knee and ankle stability and mobility, as well as balance and coordination. In-line Lunge (Move on a Single Line), on the other hand, tests hip and leg strength, mobility and balance, while also observing spine stability and movement symmetry (Şahin et al., 2018).

The Shoulder Mobility test measures the flexibility and mobility of the shoulders and upper back, while assessing the symmetrical ability to move in the shoulder girdle. The Active Straight-Leg Raise test tests hip and hamstring flexibility and evaluates lower body mobility. The Trunk Stability Push-Up test tests upper body strength and spine stability, while evaluating central body strength and control (Altundağ and Uçan, 2019). Finally, the Rotary Stability test measures trunk and hip stability and motion control, as well as assessing symmetrical and coordinated movement. All of these tests help football players improve their performance and prevent injuries. FMS tests have many benefits for football players (Duran, 2021).

FMS tests help to take preventive measures by determining the injury risks of football players at an early stage. This allows athletes to continue their careers in a healthier way. In addition, FMS tests maximize the performance of football players by increasing their mobility and flexibility. It contributes to the balanced development of both sides of their body, which allows for better balance and control during the game. Finally, personalized training programs can be created for football players based on the results of the FMS, which offer specific development plans for the individual needs of each athlete. In this way, both the performance and the overall health of the footballers are optimized (Marques et al., 2017).

FMS tests are usually administered by a physiotherapist, trainer or movement specialist. Each test is evaluated using a specific scoring system, with scores ranging from 0 to 3, for a total of 21 points. By observing the movement patterns of the football players, the areas that need to be corrected are determined and intervention plans are created accordingly. FMS tests are an important tool for optimizing the health and performance of football players. Through these tests, customized training and rehabilitation programs can be developed according to the individual needs of the athletes, thus making it possible to maximize the potential of each athlete and minimize the risk of injury (Kiesel et al., 2011).

Digitál goniometers are electronic measuring instruments that are used in various fields of application as a product of modern measurement technology. These devices usually measure an angle in degrees and have the ability to measure between 0 and 360 degrees. Some models also have the ability to measure in different angle units, such as radians or grads. Digitál goniometers offer high accuracy; This increases the accuracy of the measurement results. The measurement results are usually displayed on large and clear digital displays, making them easy to use. In addition, some models offer additional functions, such as storing measured values in memory, converting them into different measurement units. Digitál goniometers are used in a wide range of applications, from medical fields to engineering applications, and are considered an important tool in any process that requires precise measurement (Svensson et al., 2019).

1.2. Purpose

In this research; By examining the effect of flexibility and functional test values of candidate football players playing in the UI 5 Youth Football League, which is the youngest age football league category in the TRNC, on their talent skills on the field, it is aimed to obtain results that will set a model in the coming years and to emphasize the importance of physical, flexibility and functional values for coaches. The main theme of the research is that football players playing in the UI 5 league can improve their FMS Tests and Flexibility tests, progress by training regularly, and the results of the tests may vary.

1.2.1. Hypotheses

The research hypotheses are given below:

- H0: Deep squat does not make a difference on hip range of motion.
- H1: Deep squat increases hip range of motion.
- H0: High stepping does not alter the range of motion of the knee joint.
- H2: High stepping increases knee joint range of motion.
- H0: A single-line lunge does not make a difference in lower extremity range of motion.
- H3: Single line lunge increases lower limb range of motion.
- H0: Shoulder mobility exercises do not alter shoulder range of motion.
- H4: Shoulder mobility exercises increase shoulder range of motion.
- H0: Active straight leg lift makes no difference in hip range of motion.
- H5: Active straight leg lift increases hip range of motion.
- H0: Trunk stability exercises do not alter the range of motion of the hips.
- H6: Trunk stability exercises increase hip range of motion.

1.2.2. Assumptions
The assumptions of the research are listed below;

- The preferred method in the research was assumed to be suitable for the goal of the research.
- The scale and questions selected for the collection of data are assumed to be reliable and valid.
- The data obtained are assumed to be valid and reliable.

1.2.3. Limitations
This research; It consists of 15-year-old football players living in Nicosia, Famagusta, Kyrenia, Güzelyurt and İskele districts in the Turkish Republic of Northern Cyprus. The resources used and the scale questions were limited to the participants to whom the scale was applied.

1.2.4. Definitions
FMS tests: a test battery used to assess athletes' mobility abilities and determine possible injury risks (Şahin et al., 2018).

Digitál goniometers: They are electronic measuring instruments used in various fields of application as a product of modern measurement technology (Svensson et al., 2019).

1.3. Importance of the Study
Comparison of Functional Movement Screening (FMS) tests and digital goniometer measurement values in U15 age category football players provides an objective evaluation of the athletes' movement quality and joint range of motion. FMS tests are intended to identify potential movement defects in football players by assessing basic movement patterns and symmetry. These tests can help personalize training programs to optimize athletes' movement performance and reduce the risk of injury.

On the other hand, digital goniometers precisely measure joint angles of motion and record the data digitally, making it easy to analyze. These instruments provide more accurate measurements than traditional handheld goniometers and are useful for tracking changes over time. Comparative studies in U15 football players are important to understand the relationship between FMS test results and digital goniometer measurements and to determine how these evaluation methods contribute to the developmental process of young athletes.

Since such a research has not been carried out in the TRNC in previous years, the originality of the study is in question. The importance of this scientific study increases the importance of this scientific study by shedding light on the coaches working in the TRNC UI 5 league in recognizing the capacities of the athletes, contributing to them in the treatment of physical development, injuries and organizing training programs.

2. CONCEPTUAL FRAMEWORK
2.1. Football
The history of football dates back to the 19th century, and its modern rules were developed in England. Over time, this sport has become an international phenomenon and is played professionally and amateurly by millions of people around the world. The popularity of football has only increased with tournaments and leagues being held around the world. Major organizations such as the FIFA World Cup and the UEFA Champions League are important examples of the global impact and fan base of this sport (Orta, 2020). Football is a team sport played between two teams, with each team consisting of 11 players. The main objective of this game is to score a goal by passing the ball across the opposing team's goal line. Football is one of the most popular sports around the world and is played according to the rules set by FIFA (International Football Federation). Matches usually take place in two halves of 45 minutes, for a total of 90 minutes. There is a goal at each end of the field and the game is played on a rectangular field. It is necessary that the ball has a spherical shape and has a certain weight and size. The team that scores the most goals wins the match. Players demonstrate strategy, teamwork, and individual skills using both their physical and mental abilities. Rules such as offside, free kicks, and penalties ensure that the game is fair and competitive. This sport, which can be played and watched by people of all ages and walks of life, is followed with great interest and passion around the world (Ceyhan, 2020).

2.2. Functional Movement and Functional Movement Analysis
The Functional Movement Analysis (FMA) test, developed as a result of the validity and reliability study conducted by Minick et al. (2010), is a widely used test developed by Minick et al. (2010) to determine functional movement limitations. This test involves an assessment of a variety of movements and provides information about the individual's body mechanics, movement quality, and potential functional limitations. The FMA test includes a variety of movements such as deep squats, obstacle step, forward stepping, shoulder mobility, active straight leg lifts, trunk stability push-ups, and rotation stability. These movements assess the

range of motion, coordination, balance, and stability of the individual's joints and muscles. Test results are used to identify potential risks or deficiencies that may affect performance in athletes or individuals. The FMA test is used by healthcare professionals and sports coaches and is considered an important tool in assessing the physical capacities of individuals and developing individual programs to optimize their performance (Çağın, 2023).

The Functional Movement Analysis (FMA) test is a test battery used to predict potential injury risks by identifying asymmetries and weak movement patterns in functional movement patterns. The FMA test is used as an important tool to evaluate the physical performance of athletes and active individuals, to improve the quality of movement and to minimize potential risks. Health professionals and coaches can develop individual corrective exercise programs and rehabilitation strategies based on these test results (Çağın, 2023).

The Functional Movement Analysis (FMA) test includes 7 different movements used to assess functional ability. Of these movements, 3 are used to assess general functional abilities, while 2 are designed to assess flexibility and the other 2 are designed to assess stability. Each move is given a score between 0 and 3. When these scores are added together, the individual's total score is between 0 and 21. The highest score (3) indicates that the movement is good; A low score (1) indicates that the movement is bad; a score of zero (0) may indicate that the movement is painful or cannot be performed (Cook et al., 2006). This test is used as an important tool to identify disorders in movement patterns and develop treatment or exercise programs accordingly (Durdur, 2019).

Functional Movement Analysis (FMA) is based on certain principles and methods when evaluating the movement patterns of individuals. The basic principles of FMA are as follows (Sarıkaya et al., 2023):

- Definition of Functional Movement: FMA evaluates the movement patterns used by individuals to perform activities of daily living. These movements include coordination of individuals' muscle groups, range of motion, and stability.
- Variety of Movement Patterns: The FMA test covers a wide range of movements. For example, it includes different movements such as deep squats, obstacle step, forward step, shoulder mobility, straight leg lifts, trunk stability push-ups, and rotation stability. These movements allow to assess the different functional abilities and weak movement patterns of individuals.
- Scoring System: Each move is subject to a specific scoring system in the FMA test. Movements are usually evaluated with a score between 0 and 3. The highest score (3) indicates that the movement is good and there are no restrictions; A low score (1) indicates that the movement is weak and the presence of certain constraints; A score of zero (0) may indicate that the movement is painful or impracticable.
- Movement Asymmetry and Injury Risk Assessment: The FMA test focuses on identifying asymmetries and weak movement patterns in individuals' functional movements.
- Usage Areas: FMA is an important tool used to increase performance in athletes, reduce the risk of injury and manage the return to sports processes. It is also widely used in rehabilitation processes, general health assessments, and physical therapy applications (Sarıkaya et al., 2023).

2.3. Measurement with a Goniometer

A goniometer is an instrument used to measure joint range of motion. This measurement is often used by physiotherapists, rehabilitation specialists or sports physicians. Measurements with a goniometer are important to determine the range of motion of the joint and to monitor the progress in the rehabilitation process. Here's how the goniometer usually works (Smoke, 2019):

- Starting Position Determination: The joint to be measured (for example, knee or shoulder) is brought to the relevant position and the starting point is determined.
- Goniometer Application: The goniometer is placed on the joint and moved from the starting position. This movement is used to measure the opening in the joint.
- Making the Measurement: When the joint movement is performed, the graded ruler or markings on the goniometer indicate the angle of the movement in the joint. This angle is used to determine the range of motion of the joint.
- Recording of Results: The measurement result is recorded according to the angle determined by the ruler or markings on the goniometer. This data is used as an objective measurement of the range of motion in the joint involved (Duman, 2019).

METHOD 3

3.1. Research Model

Cross-sectional survey model was used in this study. The cross-sectional survey model is a research method used to examine the characteristics and situations of individuals or groups over a certain period of time (Dönmez and Azizoğlu 2010). This model is widely used in the evaluation of variables such as the quality of movement and

joint health of athletes. In the study conducted on U15 age category football players, screening models such as Functional Movement Screening (FMS) tests and digital goniometer measurements may have benefited from the cross-sectional screening model. This model allows to analyze the data obtained by these evaluation methods of athletes at a given time and evaluate the results. In this way, a detailed view of athletes' movement performance and potential risk factors can be provided and basic information can be obtained for planning appropriate interventions.

The Turkish Football Federation of Northern Cyprus (K.T.F.F.) organizes the U15 league in a short period of time (within 4 months). This situation causes the participating teams to not be able to fully carry out their preliminary preparations. Due to the fact that the league is played between October and March (the months when the heat does not start in the TRNC) and the U15 league is the lowest league of the youth category, the research universe creates a narrow structure.

3.2. Sampling Method

A total of 60 candidates participated in the study in 4 teams participating in the U15 league organized by K.T.F.F., which plays football in the U15 age category in the TRNC and trains regularly. The participants are male and their average age is between 14.18 years. Only volunteer football players who did not have any injuries and health problems were included in the study.

3.3. Data Collection

The aim of this study is to better understand and evaluate the movement quality and functional abilities of athletes through the comparison of Functional Movement Screening (FMS) tests and digital goniometer measurement values in athletes. Today, increasing sports performance and minimizing the risk of injury in athletes are among the priority goals for sports physicians, physiotherapists and coaches. In this context, developing the right assessment methods and intervention strategies is important to optimize the health and performance of athletes (Stanek et al., 2014).

Functional Movement Screening (FMS) is a widely used tool for detecting movement defects in athletes and determining their potential risk of injury. However, there are criticisms and controversies regarding the use of FMS. In this context, it is important to seek alternative or supportive assessment methods to improve the effectiveness and accuracy of FMS (Abdollahzade et al., 2017).

Digital goniometers are precise devices developed to objectively measure joint angles of motion. These instruments provide more accurate measurements than traditional handheld goniometers, and digital recording of data simplifies analysis and tracking. Thus, digital goniometers can be a reliable alternative in assessing joint motion angles in athletes (Campa et al., 2019; Chapman et al., 2014).

This study aims to reveal the advantages and disadvantages of both methods by comparing Functional Movement Screening (FMS) tests and digital goniometer measurement values. The findings can make a valuable contribution to the processes of assessing the quality of movement and improving performance in athletes. Furthermore, the results of the study can serve as the basis for developing more effective intervention strategies for sports physicians, physiotherapists, and coaches (Cook et al., 2014; Jafari et al., 2019).

3.4. Analysis Method

The data were analyzed using the SPSS package program. Percentage, frequency and arithmetic mean tests were applied as descriptive statistics for the demographic information of the research group. Paired Samples t-test was applied to compare the pre- and post-test data of the research group. Significance was taken as $p<0.05$.

4. FINDINGS

Table 1. Research Group's Deep Squat and Hip Movements Comparisons

Parameters	$\overline{x}$ ±ss	**t**	**p**
Deep Squat Deep Suouat Hip Flexion	3.00 ±.00 123.21 ±1.95	-481,400	0,00
Deep Squat Deep Suouat Hip Extension	3.00 ±.00 9.70 ±.69	-75,732	0,00
Deep Squat Deep Suouat	3.00 ±.00	-340,781	0,00

Hip Abduction	44.60±.93		
Deep Squat Deep Suouat Hip Int. Rotation	3.00±.00 43.00±2.46	-126,491	0,00
Deep Squat Deep Suouat Hip Ext. Rotation	3.00±.00 43.00±2.46	-126,491	0,00

*p<0.05

When Table 1 was examined, it was determined that there was a significant difference between the deep squat deep suouat and hip flexion, hip extension, hip abduction, hip int. rotation and hip ext. rotation values of the research group (p<0.05).

The study of Cook et al. (2006) suggests that Functional Movement Screening (FMS) tests can be effective in assessing athletes' movement abilities. They noted that high FMS scores were associated with a lower risk of disability. This study shows that FMS is a reliable tool that can be used to assess athletes' quality of movement and injury risk. Schneiders et al. (2011) determined FMS normative values on young and active individuals. The study found that low FMS scores may indicate mobility limitations and the potential for disability. These findings suggest that FMS standardizes the usability of movement analysis in young and active individuals and the evaluation process by providing normative data. Kiesel et al. (2007), in their study of professional football players, found that FMS tests can be used to predict injuries before the season. This study highlights that FMS can be an effective tool in predicting the injury risks that athletes may face during the season.

Table 2. Research Group's Hirbel Step and Knee Movements Comparisons

Parameters	$\overline{X}$ ±ss	**t**	**p**
Hirbel Step Right Knee Flexion	3.00 ±.00 139.37 ±2.25	-471,399	0,00
Hirbel Step Left Knee Flexion	3.00 ±.00 139.37 ±2.25	-471,399	0,00

*p<0.05

When Table 2 was evaluated, it was determined that there was a significant difference between the high stepping and right and left knee flexion values of the research group (p<0.05). There are studies with different results in the literature. The study by O'Connor and Hamill (2004), in which they examined the activation of the outer foot muscles during running, revealed that these muscles play a critical stabilizing role in knee flexion movement. This finding suggests that the muscles of the outer foot are important, especially for balanced movement, and that the lack of these muscles may adversely affect knee biomechanics. Bell et al. (2008) examined the characteristics of muscle strength and flexibility in individuals with excessive medial knee displacement, indicating that muscle imbalances around the hip and knee may contribute to knee injuries. This study provides an important perspective on how muscle imbalances can affect knee stability and movement efficiency, in particular. Powers' (2010) study looked at how abnormal hip mechanics affect knee injuries. In particular, it has been emphasized that the weakness of the hip abductor muscles can adversely affect knee stability and this may increase the risk of knee injury.

Table 3. Research Group's Comparisons of Single Line Lunge and Lower Extirimity Movements

Parameters	$\overline{X}$ ±ss	**t**	**p**
Single Line Lunge Right Ankle Plantar Flexion	2.98±.12 39.95 ±.28	-918,053	0,00
Single Line Lunge Right Dorsal Flexion	2.98±.12 29.98±.12	-1155,019	0,00
Single Line Lunge Right Eversion-Inversion	2.98±.12 27.96±.25	-677,055	0,00
Single Line Lunge Left Ankle Plantar Flexion	2.98±.12 39.95±.28	-918,053	0,00

Single Line Lunge Left Dorsal Flexion	2.98±.12 29.98±.12	-1155,019	0,00
Single Line Lunge Left Eversion-Inversion	2.98±.12 29.98±.12	-677,055	0,00

*p<0.05

When Table 3 was examined, it was determined that there was a significant difference between the single line lunge right and left and the ankle plantar flexion, dorsal flexion and eversion-inversion values of the research group (p<0.05).

Academic studies on ankle dorsiflexion range of motion examine the important effects of this parameter on health and performance and evaluate them in different contexts. Studies selected from the relevant literature deal with the subject from various perspectives. Rabin et al. Research by (2014) found that reduced range of motion of the ankle dorsiflexion can increase the risk of ankle injuries. This finding highlights the effects of dorsiflexion range of motion not only on mechanical stability but also on injury risk. Rabello et al. (2022), on the other hand, determined that the range of motion of the ankle dorsiflexion during single leg squats in patients with patellofemoral pain syndrome may lead to compensatory movements in the knee joint. This study considers the effects of dorsiflexion range of motion on general lower extremity functions, not just local. Research by Hoch et al. (2012) evaluated the effect of ankle dorsiflexion range of motion on dynamic postural control. The findings showed that the decrease in dorsiflexion range of motion may adversely affect postural stability, revealing that this parameter is related to postural control mechanisms.

Table 4. Research Group's Comparison of Shoulder Mobile Movements

Parameters	$\overline{x}$ ±ss	**t**	**p**
Shoulder Mobility Right Shoulder Flexion	2.98±.12 179.98 ±.12	-7571,794	0,00
Shoulder Mobility Right Shoulder Extension	2.98±.12 45.00±.00	-2563,000	0,00
Shoulder Mobility Right Shoulder Abduction	2.98±.12 180.00±.00	-10798,000	0,00
Shoulder Mobility Right Shoulder Int. Rotation	2.98±.12 79.36±1.86	-318,607	0,00
Shoulder Mobility Right Shoulder Ext. Rotation	2.98±.12 90,00±,00	-5308,000	0,00
Shoulder Mobility Left Shoulder Flexion	2.98±.12 179.98 ±.12	-7571,794	0,00
Shoulder Mobility Left Shoulder Extension	2.98±.12 45.00±.00	-2563,000	0,00
Shoulder Mobility Left Shoulder Abduction	2.98±.12 180.00±.00	-10798,000	0,00
Shoulder Mobility Left Shoulder Int. Rotation	2.98±.12 79.36±1.86	-318,607	0,00
Shoulder Mobility Left Omuz Ext. Rotation	2.98±.12 90.00±.00	-5308,000	0,00

*p<0.05

When Table 4 was evaluated, it was determined that there was a statistically significant difference between the right and left shoulder flexion, shoulder extension, shoulder abduction, shoulder int. rotation, shoulder ext. rotation values of the research group (p<0.05).

The study by Ellenbecker and Davies (2000) highlights the critical importance of shoulder ranges of motion in isokinetic testing and rehabilitation of the shoulder complex. Shoulder flexion, extension, abduction, internal and external rotation values play a vital role in evaluating shoulder functions and determining injury risks. The study states that balanced shoulder range of motion is important for athletes to optimize their performance and reduce the risk of injury. Research by Wilk et al. (2009) examined changes in shoulder range of motion and strength of

professional baseball players throughout the season. In particular, it was observed that internal rotation increased and external rotation decreased on the dominant arm. These findings suggest that shoulder range of motion may differ between the dominant and nondominant arm and may affect athletes' seasonal performance. The study by Phrathep et al. (2023) examined the associations between hamstring muscle stiffness, shoulder rotation range of motion, and throwing rate in professional baseball players. Research has shown that the increase in shoulder external rotation range of motion has a positive effect on the rate of fire. He also emphasized that the balance and coordination of shoulder ranges of motion are critical for athletic performance.

Table 5. Research Group's Comparisons of Active Straight Leg Lift and Hip Movements

Parameters	$\overline{X}$ ±ss	**t**	**p**
Active Straight Leg Lift Right Hip Flexion	2.98±.12 123.21 ±1.95	-487,312	0,00
Active Straight Leg Lift Right Hip Extension	2.98±.12 9.70±.69	-73,917	0,00
Active Straight Leg Lift Right Hip Abduction	2.98±.12 44.60±.95	-335,515	0,00
Active Straight Leg Lift Right Hip Int. Rotation	2.98±.12 43.00±2.46	-125,690	0,00
Active Straight Leg Lift Right Hip Ext. Rotation	2.98±.12 43.00±2.46	-125,690	0,00
Active Straight Leg Lift Left Hip Flexion	2.98±.12 123.21 ±1.95	-487,312	0,00
Active Straight Leg Lift Left Hip Extension	2.98±.12 9.70±.69	-73,917	0,00
Active Straight Leg Lift Left Hip Abduction	2.98±.12 44.60±.95	-335,515	0,00
Active Straight Leg Lift Left Hip Int. Rotation	2.98±.12 43.00±2.46	-125,690	0,00
Active Straight Leg Lift Left Hip Ext. Rotation	2.98±.12 43.00±2.46	-125,690	0,00

*p<0.05

When Table 5 was evaluated, it was determined that there was a statistically significant difference between the right and left and hip flexion, hip extension, hip abduction, hip int. rotation, hip ext. rotation values of the research group (p<0.05).

The study by Hamstra-Wright et al. (2017) examined the relationship between hip flexibility and hip strength in individuals with low back pain. The study found that low back pain is common in individuals with reduced hip flexion range of motion and that these individuals have difficulty in the ADBK (Active Hip Flexion-Extension) test. These findings suggest that the ADBK test is associated with hip flexion range of motion and that this parameter is an important factor on the risk of low back pain. The study by Leporace et al. (2020) examined the relationship between hip range of motion and lower extremity muscle strength in college athletes. The research found that hip flexion, abduction, and rotation range of motion showed a positive correlation with ADBK test performance. It has been emphasized that hip range of motion is important in terms of balance and coordination in athletes.

Table 6. Research Group's Comparison of Trunk Stability and Hip Movements

Parameters	$\overline{X}$ ±ss	**t**	**p**
Body Stability Push-Ups Hip Flexion	2.98±.12 123.21 ±1.95	-485,139	0,00
Body Stability Push-Ups Hip Extension	2.98±.12 9.70±.69	-73,347	0,00
Body Stability Push-Ups	2.98±.12	-354,952	0,00

Hip Abduction	44.60±.95		
Body Stability Push-Ups Hip Int. Rotation	2.98±.12 43.00±2.46	-127,774	0,00
Body Stability Push-Ups Hip Ext. Rotation	2.98±.12 43.00±2.46	-127,774	0,00

*p<0.05

When Table 6 was examined, it was determined that there was a statistically significant difference between the body stability of the research group and push-ups and hip flexion, hip extension, hip abduction, hip int. rotation, hip ext. rotation values (p<0.05). The study by Leetun et al. (2004) examined the relationship between trunk stability and lower extremity injuries in athletes and found that athletes with poor trunk stability generally had reduced hip flexion and extension range of motion. These findings reveal a significant relationship between trunk stability and hip range of motion. In the study conducted by Nesser et al. (2008), the relationship between body stability and performance in Division I football players was examined. Research has found that players with high body stability have better hip flexion and extension range of motion. These findings support a positive relationship between trunk stability and hip range of motion. The study by Borghuis et al. (2008) examined the effect of sensory-motor control on body stability. Research has shown that good sensory-motor control positively affects hip abduction and rotational range of motion. These results highlight that there may be significant differences between trunk stability and hip range of motion.

Table 7. Research Group's Comparisons of Active Straight Leg Lift and Hip Movements

Parameters	$\overline{x}$ ±ss	**t**	**p**
Rotation Stadium Right Hip Flexion	2.98±.12 123.21 ±1.95	-471,803	0,00
Rotation Stadium Right Hip Extension	2.98±.12 9.70±.69	-75,473	0,00
Rotation Stadium Right Hip Abduction	2.98±.12 44.60±.95	-337,453	0,00
Rotation Stadium Right Hip Int. Rotation	2.98±.12 43.00±2.46	-128,260	0,00
Rotation Stadium Right Hip Ext. Rotation	2.98±.12 43.00±2.46	-128,260	0,00
Rotation Stabite Left Hip Flexion	2.98±.12 123.21 ±1.95	-471,803	0,00
Rotation Stabite Left Hip Extension	2.98±.12 9.70±.69	-75,473	0,00
Rotation Stabite Left Hip Abduction	2.98±.12 44.60±.95	-337,453	0,00
Rotation Stabite Left Hip Int. Rotation	2.98±.12 43.00±2.46	-128,260	0,00
Rotation Stabite Left Hip Ext. Rotation	2.98±.12 43.00±2.46	-128,260	0,00

*p<0.05

When Table 7 was evaluated, it was determined that there was a statistically significant difference between the rotation stability of the research group and the right and left rotation values of hip flexion, hip extension, hip abduction, hip int. rotation, hip ext. rotation (p<0.05).

A study by Leetun et al. (2004) revealed that athletes with poor trunk stability had reduced hip flexion and extension range of motion. Nesser et al. (2008), on the other hand, found that athletes with high body stability had better hip flexion and extension range of motion in Division I football players. The study by Borghuis et al. (2008) showed that good sensory-motor control positively affects hip abduction and rotation range of motion. These results highlight that sensory-motor control is associated with trunk stability and plays an important role in controlling hip range of motion.

In this context, the relationships between trunk stability and hip range of motion are considered as an important factor in the management of athletes' movement performance, injury risk and rehabilitation processes. These studies are important in terms of understanding the effects on athlete health and performance and contributing to the optimization of training programs.

5. CONCLUSION AND RECOMMENDATIONS

The aim of this study was to compare Functional Movement Screening (FMS) tests and digital goniometer measurement values in U15 age category football players in the Turkish Republic of Northern Cyprus. The findings obtained in the physical evaluation tests of the research group reveal that the U15 age category football players differ in terms of various physical characteristics. In the evaluations made in tests such as deep squat, high stepping, single line lunge, shoulder mobility, active straight leg lift, trunk stability, push-ups and rotation stability, statistically significant differences were determined between the movement values of the football players such as hip flexion, extension, abduction, internal rotation and external rotation. These results show that football players have different physical abilities according to their position and depending on the type of testing, and these characteristics affect their performance.

The findings of this study show how the physical characteristics of U15 age category footballers vary according to their position and type of test. Accordingly, the following recommendations can be taken into account when developing training programs and performance enhancement strategies:

- Individualized Training Programs: Individual training programs should be created in line with the FMS test results and digital goniometer measurements of the football players. For example, specific exercises and rehabilitation techniques can be applied that target the identified weak points.
- Position-Oriented Physical Preparation: Considering that football players may have different needs according to their positions, training programs should be designed with a position-oriented approach. For example, exercises that focus on features such as joint stability and shoulder mobility may be important for goalkeepers, while work on developing speed and agility may be a priority for attacking players.
- Continuous Evaluation and Feedback: The physical abilities of the football players should be evaluated regularly and their training programs should be updated in line with these evaluations. The performance improvement process should be supported by providing regular feedback.
- Strategies to Reduce the Risk of Injury: Preventive measures should be taken to reduce the risk of injury by focusing on the identified movement defects and deficiencies. This is critical in terms of maintaining the health of footballers and sustaining their performance in the long term.

These suggestions can be used to support the physical development of U15 age category footballers in the Turkish Republic of Northern Cyprus and to improve their performance. Taking a customized approach based on each player's individual needs and test results can improve overall team performance and minimize the risk of injury.

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Digital Competence Among Islamic Teachers: A Pilot Study on Validity and Reliability

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ABSTRACT
It is a necessity for a researcher to ensure that the validity and reliability of the study is met to prove a discovery. However, there are still qualitative researchers who are still reckless and do not emphasize the concept of validity and reliability when designing, collecting, and analysing the research findings. The quality of a qualitative study depends on the honesty, compliance, and thoroughness of the researcher in carrying out the study in a systematic and structured manner. Therefore, this study aims to analyse the qualitative validity and reliability strategy according to scholars' views as well as describing the validity and reliability strategy carried out in the pilot study. Through document analysis, the concept of validity and qualitative reliability can be explained through four concepts namely credibility, dependability, reliability, and confirmability. Among the strategies that can be used in pilot study to increase its validity and reliability is by peer review that takes place during the construction, review, and verification of the interview protocol. Reflective journal writing can also help increasing the reliability of the pilot study. It is hoped that this article can expand the reader's knowledge related to validity and reliability, especially in conducting pilot studies and at the same time, help qualitative researchers in carrying out their procedures properly to guarantee the quality of the research.
Keywords: Validity, Reliability, Trustworthiness, Pilot study, Qualitative

Introduction

The naturalistic approach implemented in qualitative research can provide a deep natural understanding of the phenomenon being studied. Researchers explain the phenomenon based on their own perspective because one's understanding could be different depending on their own point of views. But in qualitative research, there are clear guidelines for the researchers to prove their findings and make them more reliable.

However, in reality, there are still qualitative researchers who did not carry out the data collection procedures properly and convincingly to justify the findings of their study. Nordin et.al (2018) found that qualitative researchers faced problems in their data collection, whereby they fail to collect variety of data types as well as incomplete data. This scenario shows that researchers have not yet fully understood the need for data collection from various sources to help improve the validity and reliability of research findings through triangulation strategies. The effect of misinterpreting this concept can cause biases during the process of analysing the data. This is in line with Noble & Smith's (2015) study which explains that most qualitative researchers are often criticized because they are not transparent in carrying out the process of analysing data, which consequently causing their findings to be biased and influenced by their personal opinions.

Based on the writing patterns related to the validity and reliability of qualitative studies, most scholarly discussions are focussed on the concept of qualitative validity and reliability in the real field (Kamarul Jasmi & Hilmi 2022; A. Stahl & R. King 2020; Nordin et.al 2018; Zettiey & Karmila 2016; Noble & Smith 2015; Basheer et al 2008). Yet, there are no such guidelines being discussed which focus on the concept of qualitative validity and reliability, especially at the beginning stage, the phase of designing the study including the construction of instruments (interview protocol) as well as the importance of conducting the pilot study. As a matter of fact, the beginning stage of the study is paramount to ensure that the findings could really explain the actual scenario that occurs and guarantee the credibility as well as the reliability of the qualitative study (Ghazali & Suffean 2016).

Based on the problem explained, this article aims to analyse validity and reliability strategies in qualitative studies based on the views given by leading scholars as well as to describe the strategies that can be used in the pilot study on the same respect. Therefore, this study is very important to provide guidance for researchers to plan and carry out the proper procedures in the collection and analysis of qualitative data. The discussion of this article could shed some lights on the difference between the concept of validity and reliability of quantitative research which is more statistical in nature compared to the concept of trustworthiness and compliance of qualitative research which is more dynamic and flexible. Even so, the findings on both of these types of studies must be proven with a strategy that have been determined according to their respective methodological paradigms.

Validity & Reliability in qualitative research

Validity in qualitative research refers to the accuracy or credibility of the research findings (Maxwell 1996) where the data can be accurately explained through the description of the characteristics of the phenomenon (Hammersley 1987) that really happened to represent the study participants (Cresswell & Miller 2000). The process of validity depends on the ability of the researcher to prove the phenomenon that had occurred (Rasid & Raman 2015) with the support of evidence (Othman Lebar 2009) to describe the reality in the field, even if only by reading the research report provided (Chua Yan Piaw 2006).

According to qualitative scholars, the concept of validity needs to be defined in accordance with the paradigm of interpretivism to emphasize the quality of the study in order to be carried out correctly (Stenbecka 2001). However, the validity of qualitative research has been detailed by Davies & Doss 2002, by exploring the subjectivity, reflexivity and social interaction of the interview to distinguish it from other studies that used a positivist approach. The views of these two scholars are in favour of Lincon & Guba (1985), who proposed a new idea of measurement which is by ensuring that the data can be defended and therefore build up the confidence in others about the findings of the study. Although originally, qualitative study does not require validity, but there is an awareness among qualitative researchers to create a similar concept as a review tool or qualification measure to validate their study (Morse et.al 2002).

For Hammersley & Atkinson (1983) validity does not focus on the data but rather refers to the inference generated from it. This is because researchers need to ensure the validity of their research findings as well as prove that the assumptions of the chosen research paradigm have been implemented properly and accurately. This is supported by Patton (2001) who explained that researcher needs to ensure that validity should start from the phase of designing, collecting and analysing the data, and evaluating the quality of the study. Therefore, the researcher should really emphasize validity of the study to ensure that the real phenomenon can be translated through the findings.

Qualitative research, on the other hand can be depicted through several scholars' views who focus on research findings that can be replicated in the same or different time (Merriam 1998). It also means that qualitative research findings can be compared and any differences therein can be explained (Rasid & Raman 2015). Reliability can also be recognised with the concept of consistency of the data collected. According to Othman Lebar (2009), data consistency does not mean that the same results can be achieved again, but the findings of the study however can be proven through the validity process in a qualitative study (Seale 1999). Hammersley (1992) added that data consistency should be agreed upon by several researchers, in the same or different group, regardless of the same or different situations.

The purpose of reliability in qualitative research is to generate an understanding (Stenbecka 2001). In order to achieve that goal, the reliability of the study can be strengthened by the formation of consistent constructs through methodology and study operations that are constantly updated (Rasid & Raman 2015). This shows that the reliability of this qualitative approach depends on the ability and skill of the researcher to conduct the study according to the current situation (Patton 2001; Lincon & Guba 1985). This is because studies involving human behaviour are not static and rather difficult to be determined even in the same situation should the researcher decided to conduct a repetition of that particular study (Noble & Smith 2015). But Patton (2001) insists that the reliability of the study can be achieved with sufficient validity in a qualitative study.

Based on the discussion of validity and reliability in qualitative research, the researcher can conclude that these two concepts are interrelated and dependent upon one another. Nonetheless, the roles of qualitative in terms of validity and reliability showed distinctive criteria with the quantitative context. In this study, the researcher defines validity and reliability in accordance to the suggestions conferred by Lincon & Guba (1985) who use the term honesty (trustworthiness) as an accurate phrase to describe validity and reliability in a qualitative approach. There are four criteria proposed to measure trustworthiness, namely; credibility, transferability, dependability and

confirmability. Table 1 below shows a summary of the equivalence of the concept of validity and reliability in quantitative and the concept of trustworthiness in qualitative.

Table 1: A summary of the equivalence of quantitative and qualitative research evaluation concepts. Excerpt from Noraini Idris 2013.

Quantitative Validity and Reliability Criteria	Qualitative Trustworthiness Criteria
Internal Validity	Credibility
External Validity	Transferability/Applicability
Reliability	Dependability/Consistency
Objectivity	Confirmability/ Neutrality

Based on the table above, the emphasis on trustworthiness criteria focuses on ensuring that qualitative research findings can be implemented with systematic validity and reliability procedures to generate undisputable findings in the evaluation of the study. Next, the researcher will discuss the strategy of validity and reliability in qualitative research.

Methodology

In gathering information and materials, this study uses a literary approach through literature sourced from journal articles and books related to qualitative methodology. There are several main sources of methodology reference books that are selected as primary data such as Qualitative Research: A Guide to Design and Implementation written by Sharan Merriam 2009 in the third and fourth editions co-written with Elizabeth J. Tisdell 2016, An Expanded Sourcebook: Qualitative Data Analysis second edition written by Matthew B. Miles & A. Michael Hubberman 1994, Qualitative Inquiry & Research Design second edition written by John W. Creswell 2007, Qualitative Research in Education: An Introduction to Theory and Methods written by Bogdan, R. & Biklen, S.K. 2003, *Penyelidikan Kualitatif: Pengenalan kepada Teori dan Metode* written by Othman Lebar 2017 and *Metodologi Penyelidikan dalam Pendidikan: Amalan dan Analisis Kajian* written by Ghazali Darussalam & Sufean Hussin 2016.

These methodology books are chosen because they are written by scholars who are often quoted as the references among qualitative researchers. Moreover, a Malay edition book is also listed to help the researcher form better understanding of the concepts discussed. This is also due to the fact that the researcher had limited access to some original books written by other scholars in qualitative method such as Lincon & Guba, Patton, and so on. Apart from that, various journal articles especially those that discuss qualitative methodology have become the researcher's supporting reference. The process of collecting the material begins with the search and collection of information through printed and electronic materials, which are then analysed through content analysis.

Content analysis techniques are used to generate findings to answer the objective of the research, which is to analyse the validity and reliability of qualitative studies according to scholars' views and to explain the process in the pilot study. This technique is used in line with the views of Bell and Bryman (2007) and Bryman (2008) who postulated that one of the advantages of the document content analysis technique is that it allows the researcher to analyse the value and detect 'what' can be obtained in a document and allows the analysis of value or patterns and changes that occur in a long period of time.

However, the literature is limited only to the information sourced in relation to the scope of the study since it is heavily dependent on the materials available in the library.

Findings

1. **Qualitative validity and reliability strategy analysis**

There are various strategies proposed by qualitative scholars to ensure trustworthiness in qualitative studies. In this article, the researcher had formulated a validity and reliability strategy based on the views of several leading scholars in qualitative research. But this discussion is based on the concept of trustworthiness proposed by Lincon & Guba 1985 and added by Merriam 2009 which is from the aspects of credibility, transferability, dependability and confirmability.

Internal Validity/Credibility

Internal validity relates to how the findings of the study correspond to reality (Merriam 2009). The intended reality is the truth or what actually exists and happens. However, the reality itself is subject to abstract, subjective and constantly changing according to time and circumstances. Therefore, the credibility of a qualitative researcher needs to be emphasized to ensure that the findings of the study can be justified and there is no doubt about it. This effort is highly dependent on the researcher's ability in carrying out the research process, understanding and

reporting real phenomena in the field (Rasid & Raman 2015). There are several strategies in qualitative internal validity as shown in table 2 below.

Table 2: Internal Validity Strategy

Internal Validity/ Credibility	•Triangulation/Multi method Strategies	*Merriam & Tisdell 2016; Creswell 2014; Guest et.al 2014; Merriam 2009; Mc Millan & Schumacher 2006; Bogdan & Biklen 2003; Yin 1994; Matthew B. Miles & A. Michael Huberman 1994; Patton 2001; Lincon & Guba 1985*
	•Peer checking/ Participant review /Elicit feedback from participants after summarizing their interview	*Merriam & Tisdell 2016; Creswell 2014; Guest et.al 2014; Merriam 2009; Johnny Saldana 2009; Mc Millan & Schumacher 2006; Lincon & Guba 1985*
	•Adequate engagement in data collection/ Prolonged & persistent field work/ Prolonged engagement	*Merriam & Tisdell 2016; Creswell 2014; Merriam 2009; Mc Millan & Schumacher 2006; Bogdan & Biklen 2003; Lincon & Guba*
	•Negative case analysis	*Guest et.al 2014; Creswell 2014; Meriam 2009; Mc Millan & Schumacher 2006; Lincon & Guba 1985;*
	•Reflexivity-researcher position/Researchers bias	*Merriam & Tisdell 2016; Creswell 2014; Merriam 2009;*
	•Peer review/examination/ Peer debriefing	*Merriam & Tisdell 2016; Creswell 2014; Guest et.al 2014; Merriam 2009; Johnny Saldana 2009; Bogdan & Biklen 2003; Lincon & Guba 1985*

Based on the table above, there are six strategies that can be considered by qualitative researchers in ensuring high validity. The triangulation method is a strategy that is widely suggested by most qualitative scholars. It is a validity procedure where researchers use more than one method in a study such as data sources, data collection methods, analysis methods and the use of various mediums to form categories and themes in a study (Merriam 2009; Rasid & Raman 2015; Othman Lebar 2006). Therefore, the findings obtained from one method will be strengthened by another. This will increase the validity of qualitative research findings (Zanaton et.al 2016).

Denzin (1978) explained that there are four types of triangulations, namely; the use of various methods, various data sources, various researchers and various theories to confirm the findings of the study. Merriam (2009) detailed triangulation as covering a process where the researcher can use various methods in data collection such as validating interviews by making observations and research documents to see their relevance towards the phenomenon being studied. Next, various data sources can be implemented by comparing the findings through cross checking observations made at different times or different places, through interviews with people from different perspectives and even through extended interviews. In addition, researchers can use various theories in one study to understand the aspects involved holistically. And lastly, Patton (2001) explained that two or more researchers conducting the study can analyse and compare their findings which will increase the validity of the study.

Peer review or the validity from the research participants is one of the internal validity strategies proposed by re-referencing the data and findings as interpreted by the researcher (Merriam 2009). This process involves three phases; the participants validate the interview transcript; validating the understanding and interpretation made by the researcher; verifying the initial analysis (Zanaton et.al 2016) to avoid misunderstanding or misinterpretation from the researcher's perspective related to the phenomenon that is happening (Maxwell 2013). This process can help increasing the credibility of the researcher in generating real findings. Thus, the researcher has a role to improve the data in line with the comments given by the study participants. Indirectly, researcher's biases can be reduced in the study.

Next, the length of time spent at the field can increase the credibility of qualitative research findings (Merriam & Tisdell 2016; Creswell 2014; Merriam 2009; Mc Millan & Schumacher 2006; Bogdan & Biklen 2003; Lincon &

Guba). This method allows the researcher to establish good relationship by building trust with the study participants to obtain deep and rich information on the phenomenon being studied (Norman & James 2020). The data obtained over a long period of time allows the researcher to analyse and compare them by making repeated observations and interviewing the study participants until data saturation is reached while in the field (Merriam 2009). Clearly, the length of time spent and the relationship with the research participants can guarantee the credibility of the research findings.

During data collection, the researcher needs to find parallel or contrary variations in understanding the phenomena that occur in the researcher's initial expectations. Should the researcher find opposite findings, the researcher must source for literature support to understand the phenomenon that occurs. This is in line with the recommendations by Patton (2015) who thinks that researchers need to find alternative evidence as support to explain the findings that are contrary to the original expectations. This can help in explaining the phenomenon from various angles to provide a clearer understanding to increase the confidence of the reader to understand the real phenomenon. Based on the explanation of the conflicting data earlier, it can help to strengthen the conclusion made whereby the researcher takes note and provides a comprehensive alternative explanation in discussing the findings. This negative and different case strategy can increase the credibility of the research findings (Merriam 2009).

The integrity of qualitative research can be improved by considering the researcher's position as an instrument with the process of reflexivity, where the researcher needs to be transparent in reflecting the study. Among the steps in the process are the researcher needs to explain the biases, assumptions, beliefs and values held at the beginning of the study. This is in line with the recommendations by Maxwell (2013) who said that one of the reasons why researchers need to explain their perspective and bias in conducting a study is that it is important to give the reader the context of understanding their values and expectations as these could affect the behaviour and conclusion of the study.

Next, the peer review/examination process refers to a data review process for evaluation purposes by colleagues and the public involved with the phenomenon being studied (Merriam 2009; Othman 2006). According to Zanaton et.al (2016) there are three ways in peer review which are discussions with supervisors (individuals who followed the study from the beginning), informal discussions with peers and formal discussions with individuals involved in or outside the study. In this process, these individuals are required to review and evaluate the theme whether it is reasonable or vice versa. Through question-and-answer sessions and getting feedback, it will make the research findings even more robust and focused in answering the research questions.

External Validity/Transferability/Applicability

External validity is a process that allows readers to evaluate the findings of a study to be transferred or used in a different context (Merriam 2009; Lincon & Guba 1985). However, the transferability or generalization of qualitative studies is quite difficult to achieve because this approach of interpretivism aims to understand the phenomenon that occurs in a focused manner. However, the findings of a qualitative study can be generalized with the discovery of new inquiries through the exploration of a phenomenon from various angles in depth. It is intended so that the results of the study can be applied from one different context to another. In other words, the new findings of this qualitative study can be used for other studies. Table 3 shows two strategies in external validity or transferability in qualitative studies.

Table 3: External Validity/Transferability Strategy

External Validity/ Transferability/ Applicabality	• Provide Rich and Thick Description	*Merriam & Tisdell 2016; Creswell 2014; Lincon & Guba 1985*
	• Maximum Variation/ Use the appropriate sampling.	*Merriam & Tisdell 2016; Merriam 2009; Lincon & Guba 1985*

Based on the table above, external validity can be achieved by providing a complete and detailed description in explaining the entire research process (Merriam 2009; Lincon & Guna 1985). The researcher needs to provide sufficient description to allow the reader to delve into the situation described in the study. Among the descriptions that need to be detailed in this process are information on the context of the study, data collection methods including the time frame and the field framework (Cátia Quintão et.al 2020). This clear and rich narrative description is transferable and can be used by other researchers in conducting their research. In summary, the preparation of this rich and detailed description can be a guide to other researchers for its applicability in new research contexts.

Another strategy that can increase transferability is by properly considering the selection of study samples. It can be achieved by diversifying sample variations in the study by involving several different sample backgrounds,

cases and situations to see various dimensional angles in understanding a phenomenon (Patton 2015). The purpose of maximizing sample variation is to enable the results of the study to be used by other researchers for a wider situation (Lincon & Guba 1985). This variation can be achieved through purposeful and random sample selection in qualitative studies (Othman 2006). However, Merriam (2009) added that the selection of a case can also improves transferability. It depends on the uniqueness of the case to be studied to see the specific contribution that can be learned in understanding a phenomenon.

Reliability/Consistency/Dependability

Reliability in qualitative refers to the extent to which a study can be repeated with the same results. In qualitative research, this concept of reliability is also known as dependability. According to Othman (2016), this reliability is closely related to how the researchers themselves, as the study instrument in qualitative research can ensure that something observed at different times has the same meaning to the individuals involved. This is because human behaviour is always changing. Accordingly, Lincon & Guba (1985) suggested that qualitative researchers to prove the results of the study with the support of detailed data display to show the consistency of the study. Table 4 shows some strategies that can be used to improve the reliability of qualitative studies.

Table 4: Qualitative Research Reliability Strategy

Reliability/Consistency/ Dependability	*Merriam 2009*	• Investigator's position • Triangulation • Audit Trail
	Lincon & Guba 1985	• Audit Trail • Peer Review/Examination
	Denzin & Lincon 1994	• Stability of Observation • Parallel Form • Inter-rater
	John ny Saldana 2009	• Peer Review • Initially Code-Transcribe Data • Reflective Journal
	Matthew B. Miles & A. Michael Huberman 1994	• Check Coding – Cohen's Kappa
	Bogdan & Biklen 2003	• Cohen's Kappa

Based on the table above, qualitative scholars have proposed reliability strategies in qualitative approach. As explained in the previous discussion, the researcher will discuss the audit trail strategy and peer review of the coding (inter-rater) which is measured according to the agreement of the Cohen's Kappa coefficient. Most of the suggested strategies aim to provide clarity about the research process starting from the design, the data collection, the data analysis and the reporting phases. All these phases should be justified by clear documents related to the research activities and all the results obtained during the study (Lincon & Guba 1985). This process should be prepared systematically and in detail by documenting them through writing journals and memos, keeping logs of research activities, forming a chronology of data collection and clearly recording data analysis procedures (Merriam 2009). Through this audit trail record, the results of the study will gain high reliability from the readers.

Apart from systematic documentation related to the research, expert evaluation can also increase the reliability of qualitative research findings (Denzin & Lincon 1994). This process requires the researcher to appoint several expert panels in their respective fields to review and evaluate the agreement on the themes formed in the study. Appointed experts will match the list of themes with the definitions of study terms to assess their reliability. This expert agreement process will be measured with the Cohen's Kappa index, which is the value of determining the degree of agreement of the coding done by field experts on the themes formed by the researcher (Zamri & Noriah 2003). A high expert agreement coefficient value indicates that the study has high reliability. According to Fleiss (1981), the Cohen's Kappa coefficient value determination table is as follows:

Kappa Value	**Interpretation**
≤ 0	No Agreement
0.01-0.20	Slight Agreement
0.21-0.40	Fair Agreement
0.41-0.60	Moderate Agreement
0.61-0.80	Substantial Agreement

0.81-1.00	Near Perfect Agreement / Perfect Agreement

Source: Fleiss 1981

Objectivity/Confirmability/Neutrality

Objectivity and confirmability can be achieved after credibility, transferability and consistency are met. Objectivity involves the researchers' acknowledgment of their own subjectivity against their bias related to the experience and interpretation in conducting qualitative research. Therefore, in increasing the reliability of the study, researchers should acknowledge and control their biases by explaining the assumptions and values held at the beginning of the study. Researchers need to make self-reflection through journal writing and systematic documentation of data collection and analysis activities as well as allowing review of the documents provided to ensure transparency in conducting the research process. Through this process, researchers can improve the quality of their research with the validity of the undisputed research findings. Transparency and accountability in qualitative research reflect the uniqueness and difference compared to the validity and reliability of quantitative research. The following is a table of strategies used in the objectivity and validity of qualitative research.

Qualitative Validity Strategy Table

Objectivity/Confirmability/ Neutrality	• Reflexive Journal	*Lincon & Guba 1985*
	• Audit Trail	

2. Validity and reliability in pilot study

The process of validity and reliability of qualitative study needs to start at the designing phase so that it is parallel with the construction of the objectives that need to be achieved. The researcher needs to refer to the theories used in forming the objectives at the beginning of the study as the first step towards the exploration of a phenomenon. With this, the credibility of the study can be increased through the process of referencing various theories to get an initial picture of the phenomenon being studied and it is known as the process of triangulation from a theoretical point of view (Merriam 2009).

As soon as the researcher had identified the initial objectives of the study, the researcher needs to build instruments such as interview protocols and observation inventories as the main tools that will be used during data collection. To ensure the construction of a quality interview protocol, Castillo-Montoya,M. (2016) proposed an interview framework method known as Interview Protocol Refinement (IPR). Below is the table that explains the four main phases and the objectives involved:

Table: Interview Protocol Refinement (IPR) Framework Details

Phase	Details	Objective
1	Ensure that the interview questions match the research questions.	Build a matrix mapping interview question parallel to the research question.
2	Forming interview questions in an inquiry-based conversation.	Forming interview questions using 4W 1H.
3	Receive feedback from the interview protocol.	Checking the validity of interview questions.
4	Conducting pilot study	Ensure that research questions can be understood by the study participants.

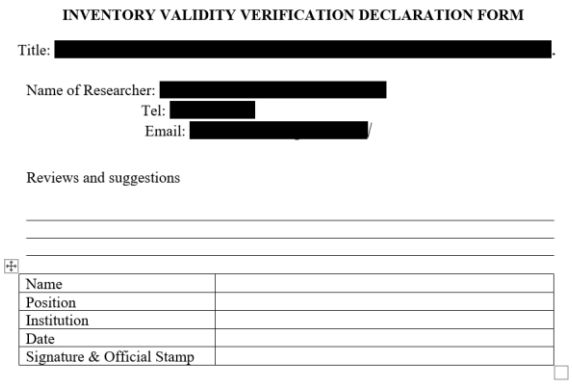
Based on the above recommendations, the researcher had developed an interview protocol for an exploratory study of the digital technology competence of Islamic Education teachers. Among other things, in building this instrument, the researcher should define the context of the study as well as the operational definition of the main elements to be explored. This process helps the researchers and the evaluation experts to check and refer to the validity of the constructed question themes. Once again, the peer review/examination process takes place in this phase, and it is parallel with the recommendations in improving the credibility and consistency of qualitative studies (Merriam 2009). The table below is a detailed phase of designing the interview protocol according to the IPR 2016 framework.

Table: Examples of IPR 2016 Construction in the Digital Technology Competence study among Islamic Teacher.

No	Type of Questions	Definition of Context	Operational Definition	Interview Questions
1	Opening Questions	The participants' background	Self and family aspects	Can you tell a little bit about your background & family?
2	Preliminary Questions	Academic Background	From school to the university	Can you talk about your career journey as a teacher?
3	Transitional Questions	The beginning of involvement	The motivation to get involved	What motivates you to be directly involved in digital technology?
4	The Main Questions of the Study	Digital Competency	Knowledge Skills Attitude	Based on your own knowledge, what elements must be present in digital technology competence? (Can you describe the element?)
5	Closing Questions	The participants' hopes	The future of technology	According to you, what is your hope to improve digital technology competence among religious teachers.

Based on the table above, it can be concluded that in the construction of this interview protocol, there are several things that need to be given attention to, such as the question format which consists of five aspects, namely, opening questions, preliminary questions, transition questions, main questions and closing questions. The purpose of these questions being structured accordingly is to make them easier for the researcher to see the continuity of the narration of the phenomenon being studied.

After completing the construction process of the interview protocol, the researcher should obtain expert validation to ensure the consistency of the objectives and themes of the research questions (Kamarul Azmi 2012). This expert validation process is known as peer review/examination which is the involvement of supervisors or field experts in validating instruments to increase the credibility of the study (Bogdan & Biklen 2013). Some experts in the field of Islamic Education, qualitative, technology and language experts have been selected to validate the theme of the research question and comments will be gathered through the attached form given to them. The following is an example of the validity declaration form inventory given to the validity expert.



INVENTORY VALIDITY VERIFICATION DECLARATION FORM

Title: [redacted].

Name of Researcher: [redacted]
Tel: [redacted]
Email: [redacted]

Reviews and suggestions

Name	
Position	
Institution	
Date	
Signature & Official Stamp	

Diagram: An example of expert validity form

Next, based on the expert's feedback and comments, the researcher has made a summary to see the entire comments and it will be discussed with the supervisor. After the discussion, the researcher has improved the interview protocol in line with the recommendations given by the experts. This process involves review by supervisors and experts to ensure that the researcher can collect data accurately and enrich the findings through interviews with the study participants. The diagram below is an example of the summary made by the researcher.

No. Item	Interview Questions	Expert 1 [redacted] Comment	Expert 2 [redacted] Comment	Expert 3 [redacted] Comment	Expert 4 [redacted] Comment	Expert 5 [redacted] Comment	Expert 6 [redacted] Comment	Final Summary Comment
1	Can you share a little about: • Age • Place of origin • Place of assignment/school environment • Years of teaching • Educational level/specialization in teaching • Experience in teaching using digital technology • Experience attending digital technology courses/training.	Add: • Residential environment • Previous educational institution • Social media platforms owned	Agree	Agree	Include the experience of participating as a facilitator in digital technology seminars.	Agree	Agree	Expert (4) comment has been provided for question number 4.
2	What do the teacher understand about digital technology?	Agree	Agree	Agree	Agree	Agree	Agree	
3	Can you define the competency of technology digital?	Agree	Agree	It is recommended to ask this question first before inquiring about digital technology.	Agree	Agree	Agree	It has been refined

Diagram: An Example of final summary of the experts' comments in the interview protocol

Next, when the permission to conduct the study has been obtained from the supervisors and the authorities such as from the Education Policy Planning and Research Division (EPRD), the State Department of Education (JPN) and the school administrators involved, the researcher had conducted a pilot study to test the interview protocol. According to Merriam (2009), a pilot study was conducted to test the methodology, procedures, and instruments to improve the quality of the study in order to be more effective in the actual field. Therefore, this pilot study is very important in qualitative research so that the researcher can identify issues and challenges and test the usability of the interview protocol that had been set.

Next, the researcher had conducted a pilot study with study participants on 15 May 2022 in one of the middle zone schools in Peninsular Malaysia. The participants were selected for this study because they met the criteria that have been set; a technology expert teacher at the national level and possess a digital skills certificate. The selection of the right study participants can help the researcher obtain rich and detailed data (Creswell 1994). The pilot study process takes three days to be completed. Throughout the study, the researcher had found several issues and challenges that had to be overcome, and all pertaining information was recorded in the journal as a reference. This reflexive journal writing is one of the reliabilities in qualitative research (Saldana 2009; Lincon & Guba 1985).

During the pilot study, the researcher had identified initial problems that need to be resolved. The researcher had formulated two important aspects that deserve attention in the reflection of the pilot study, namely the interview protocol and the researcher himself. There were several elements that had been focused and discussed in the reflection as adapted and revised from Merriam 2001 & Fraenkel & Wallen 2003). The table below is a detailed checklist of the researcher's reflection while conducting the pilot study.

Table: Pilot study Checklist Table

Main Element	**Criteria**	**Comment/ Recommendation**
Interview Protocol	Level of Language	Need to use language that is easier to understand.
	Grammar	Free from grammatical error.
	Sentence Structure	Clear and understandable.
	Understanding the Questions	There are some questions that need to be improved to make them easier for the study participants.
	Repetition	There are several questions that have the same meaning; 4&5, 7&8, 10&11.
	Clarity of Questions	Participants are clear with the intent of the question.
	Meet the Objectives	Participants can answer the questions according to the set objectives.
The Researcher	Questioning skills	The researcher needs to improve the way of questioning by lowering the level of language according to the level of understanding of the study participants.
	Probing skills	The researcher needs to be more sensitive and efficient to understand the themes conveyed by the study participants. At the beginning, the researcher was a bit

		confused to utter the next questions according their priorities. The researcher should not limit the answers from the study participants according to the sequence but continue to ask according to the pace of the participants.
	Confidence	At first, the researcher was a bit hesitant to ask questions. Over the time, after getting a rhythm, the interview session went smoothly. The study participants cooperated a lot and made the researcher feel comfortable with the session. The researcher can link the rapport from the beginning of the meeting with the ongoing interview session.
	Time taken	This interview session took quite a long time which was three days to be completed. In short, the time taken to answer a research objective was about 4 to 5 hours. Therefore, the researcher should improve the way of questioning during the interview session.

From the pilot study conducted, the researcher was able to feel the real experience in conducting a qualitative study. Among the reflections observed were to improve the interview protocol, to increase self-confidence in conducting interview sessions, to improve questioning and probing skills, to estimate an appropriate time frame while in the actual field as well as self-preparation to be ready with alternative solutions should problems arise during the data collection process.

The greatest impact on the researcher was related to the comments and ideas from the study participants in improving the quality of the interview protocol. The ideas given were based on the participants' real experiences which had helped the researcher understand the study phenomenon closely. Among the improvements that have been made were combining repeated questions, giving more accurate phrases to digital technology terms and using easy-to-understand language. As a result, the interview protocol that had been improved allows the research findings to gain high validity and reliability.

Discussion

Qualitative validity and reliability, which is more accurately known as trustworthiness, deserves attention from qualitative researchers. The four aspects of trustworthiness, namely credibility, transferability, dependability and confirmability can help to explain the process of proving the findings of a study properly. Credibility and dependability issues are often disputed to validate the research findings. This is because every research finding needs to be proven with detailed and systematic documents support. For some researchers, this is quite difficult to do because the collection of this evidence is a complicated and lengthy process. Uniquely, trustworthiness is only applied in qualitative research which makes it more exclusive compared to other research approaches. In the qualitative approach, there is no consistent measuring tool, but with systematic documentation, the disputes that arise can be resolved and thus increasing the validity and reliability of the study.

As previously discussed, validity and reliability should be emphasized even during the pilot study. This is because, the construction of right instruments, namely the interview protocol and the observation inventory, will serve great impact on the discovery of the study's findings in the future. In addition, emphasis should also be given to the researcher as an individual to be more prepared to carry out the process of data collection and data analysis as the main source in qualitative research. This includes the preparation to source for literature from various sources to gain an initial understanding of the phenomenon to be studied. This is important in helping the researcher to collect preliminary and rich data in the pilot study which can improve the gaps in the actual study.

In order to achieve that goal, peer review process is very important in the construction phase of the interview protocol whereby it involves both supervisors and experts in the field to validate the theme of the interview protocol that had been set. The experts view can help the researcher to see the scope of the study from a broader and focused perspective. This helps the researcher conduct more efficient and clear interviews while in the field. In fact, it can be said that, in a qualitative study the researcher needs to be 'united' with the instrument during data collection process. This is because the researcher needs to conduct probing during the interviews to get comprehensive and in-depth data. To do so, the researcher must be rich with information and well aware of the phenomenon to be explored. Therefore, the expert's view on the interview protocol is very important to ensure the validity of the findings.

Reflexive journal writing can also help increasing the reliability of the data whereby the researcher records every event and reflective notes are made throughout the pilot study. Although this reflective writing is not emphasized in the pilot study, the researcher feels that it is very important and meaningful to make self-reflection for the purpose of improvement in the actual field.

Conclusion and Recommendation

Based on the discussion above, it can be concluded that qualitative research is a unique approach as it is more subjective according to the lens of an individual. However, there are guidelines from leading scholars in the qualitative field to make research findings more reliable and freer of doubt, comparable to quantitative studies which are more concrete. Therefore, the validity and reliability of qualitative studies measured through their credibility, reliability, transferability, and legitimacy need to be emphasized in the early stages of the study design up until the study reporting is completed. This includes the pilot study phase because the validity and reliability of qualitative research also occurs in the early stages of the study.

The implications of this article can be used as one of the contributions for beginner researchers to clearly understand the process of qualitative validity and reliability according to the views of leading scholars and get guidelines to conduct the pilot study. A clear understanding at an early stage related to the trustworthiness of conducting qualitative research can increase the credibility and consistency of qualitative research. Among the suggestions for further research is to analyse the form of validity and reliability in the real field which gives more meaning to the quality of qualitative research according to scholars' views. In addition, future researchers can explain in detail how to reduce biases in qualitative research.

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Empowering Inclusion: Addressing Barriers in Distance Learning for Disadvantaged Groups

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ABSTRACT
The rapid expansion of distance learning in contemporary education has brought both promise and challenges, particularly for disadvantaged student populations. This article critically examines the various obstacles that hinder equitable access and participation in distance learning for marginalized groups. The discussion encompasses socio-economic constraints, digital literacy limitations, language, and cultural barriers, lack of learning support, and diminished motivation and engagement. Each challenge is explored in depth, analyzing its impact on learners from low-income backgrounds, linguistic minorities, and diverse cultural contexts. Drawing on insights from existing literature, the article underscores the urgency of addressing these obstacles to ensure a truly inclusive distance education. Proposed strategies include enhancing digital literacy training, fostering cultural sensitivity, offering financial support, and establishing robust support networks. By illuminating the barriers faced by disadvantaged groups in distance learning and offering multifaceted solutions, this article contributes to the ongoing dialogue on educational equity and the transformation of distance education into a conduit for inclusivity.

INTRODUCTION
Disadvantaged -also called marginalized or underrepresented- groups within educational settings encompass populations that face formidable social, economic, or cultural barriers that hinder their access to quality education and equitable learning opportunities. These learners frequently encounter educational barriers stemming from variables like poverty, linguistic diversity, or disabilities (Hodgson & McConnell, 2019; Taylor & Francis, 2017; Ali and Leeds, 2009a). The identification of these marginalized groups is crucial in the pursuit of addressing educational inequalities and advancing inclusivity (Taylor & Francis, 2017a). Distance education, often considered a transformative force in modern pedagogy, has witnessed unprecedented growth in recent years, especially due to global disruptions like the COVID-19 pandemic. While this mode of instruction offers flexibility and accessibility, it also reveals a "dichotomy" in its impact—providing immense opportunities while simultaneously intensifying educational disparities, particularly among disadvantaged student populations. These students confront multifaceted challenges that interfere with their equitable access to quality education in the distance learning landscape.

This paper investigates the challenges of distance education for disadvantaged students, examining specifically the barriers it intensifies. By exploring different approaches and drawing insights from the literature, this study aims to shed light on effective measures to bridge the divide and provide inclusive distance education for all. Addressing barriers in distance learning for disadvantaged groups is significant and contributes to the open and distance learning literature since it aligns with principles of equity, inclusion, and social justice. It also has the potential to drive positive change in education, policy, and practice, ultimately benefiting both individuals and society as a whole.

DISADVANTAGED GROUPS IN EDUCATIONAL SETTINGS
Disadvantaged groups mainly refer to populations that face social, economic, or cultural barriers that impede their access to quality education and equitable learning opportunities. These groups often experience educational disparities due to factors such as poverty, minority status, linguistic diversity, disability, or geographic isolation. The identification of disadvantaged groups is critical for addressing educational inequalities and promoting inclusivity. Based on the existing literature, various disadvantaged populations emerge as recurrently widespread within educational environments.

a) Low-income individuals and families are among the most prominent disadvantaged groups in education. Economic constraints limit their ability to access quality educational resources, tutoring, and extracurricular activities, contributing to an achievement gap (Ali and Leeds, 2009b).

b) Racial and ethnic minority groups often face systemic barriers in education due to historical and structural inequalities. These groups may encounter discrimination, unequal access to resources, and culturally insensitive curricula that hinder their educational progress (Brown and Brown, 2009).

c) Linguistic minorities, including non-native English speakers, often struggle with language barriers that affect their comprehension and communication. Inadequate language support can hinder their ability to fully engage in educational activities (Hodgson and McConnell, 2019).

d) Individuals with disabilities face unique challenges in educational settings. Inaccessible facilities, lack of appropriate accommodations, and limited specialized support can impede their participation and hinder their learning experiences (Slee, 2015).

e) Geographic isolation can present a significant barrier to education for rural and remote communities. Limited access to schools, educational resources, and extracurricular activities can hinder students' educational attainment (Kaufman and Alt, 2009).

f) First-generation college students whose parents did not attend higher education often lack the familial guidance and support that students from college-educated families receive. They may face challenges in navigating the complexities of higher education (Engle, 2007).

g) Refugee and immigrant populations may encounter language barriers, cultural adjustment challenges, and limited recognition of foreign credentials, which can hinder their educational pathways (Waters, 2011).

h) Gender minority individuals, including transgender and non-binary individuals, may face discrimination, lack of inclusive policies, and limited access to resources that affect their educational experiences (Marine and Herlihy, 2017; Slee, 2015).

CHALLENGES OF DISTANCE EDUCATION FOR DISADVANTAGED GROUPS

The field of education has witnessed a profound transformation with the advent of distance education, offering unprecedented flexibility and accessibility in learning (Perraton, 2000). However, within this evolving educational paradigm, it is imperative to recognize that not all learners are equally positioned to utilize its benefits. This part of the paper explores specifically the challenges that disadvantaged groups face in distance education, elaborating on the obstacles that prevent them from accessing quality learning opportunities on an equal basis.

a. Digital Divide and Technological Barriers

The advent of distance education has ushered in a new era of learning, unburdened by the constraints of traditional physical and time-related limitations. Yet, beneath the surface of this promising landscape lies a formidable challenge: the digital divide (DiMaggio & Hargittai, 2001). Defined by inequitable access to technology and the internet, this divide casts a long shadow over disadvantaged groups, disproportionately impeding their participation and engagement within online learning environments.

Uneven access to technology stands out as a prominent aspect of the digital divide, which is a reality commonly experienced by disadvantaged populations such as low-income individuals, rural inhabitants, and marginalized communities. This lack of access is particularly evident in the shortage of necessary technological equipment (Ali & Leeds, 2009b). These groups face a significant barrier to meaningful interaction with digital learning platforms due to the unavailability of essential personal devices, such as computers, tablets, and smartphones, which are crucial for active digital engagement (Bates, 2019). Adding to this divide is the issue of inadequate connectivity and limited access to high-speed internet, a crucial requirement for the effective implementation of distance education. The absence of reliable and strong internet connections disproportionately affects individuals inhabiting remote areas or economically challenged neighborhoods, making their capacity weaker to stream instructional videos, participate in synchronous activities, and download vital course materials (Taylor & Francis, 2017b).

Moreover, this technological gap goes beyond simple access and also involves learners struggling with inadequate digital literacy skills. Disadvantaged individuals often face a lack of proficiency in using digital tools, navigating online interfaces, and utilizing software applications. (Levin & Waugh, 2013). This lack of digital literacy results in a noticeable inability to effectively navigate the complexities of virtual learning environments, consequently reducing their ability to access knowledge (Salmon, 2013). In the context of online education, the field of e-learning platforms, while holding potential, presents a challenging landscape for marginalized learners. The multifaceted nature of these platforms, characterized by intricate interfaces, multimedia components, and electronic submission requirements, engenders a challenging learning curve for these learners (Ali & Leeds, 2009a). Their lack of

familiarity with these sophisticated tools often results in frustration and a noticeable reduction in the overall learning experience.

Navigating the digital landscape, especially in the context of education, can be challenging due to technical complexities, a fact that is particularly evident for disadvantaged groups. In case of connectivity issues, software compatibility problems, or other unexpected technical difficulties, these individuals often find themselves constrained by the lack of immediate and sufficient technical assistance and resources. (Mtebe & Raphael, 2018). Yet, the consequences of the digital divide extend beyond simple technological limitations, echoing significantly throughout the wider educational context. This divide serves as a regrettable catalyst for persistent educational inequalities, sustaining a harmful cycle where restricted technological access results in limited engagement with online courses, inevitably contributing to the reinforcement of disadvantage. (Taylor and Francis, 2017a). Addressing the challenges posed by these technological barriers requires a comprehensive and multifaceted strategy. Educational institutions bear the responsibility of orchestrating strategies that not only ensure equitable technological access but also nurture digital literacy competencies among disadvantaged learners. Crucially, the imperative to render e-learning platforms intuitive and user-friendly assumes crucial importance, enabling learners of all backgrounds to seamlessly engage irrespective of their technical acumen (Levin & Waugh, 2013).

b. Limited Digital Literacy Skills

The evolution of distance education heralds a transformative era in learning, offering unprecedented opportunities for knowledge dissemination. However, the true efficacy of this educational paradigm, particularly for disadvantaged groups, is profoundly influenced by the barrier of limited digital literacy skills. Digital literacy, encompassing the aptitude to navigate and harness digital tools, platforms, and resources for educational purposes, stands as a critical determiner of success in online learning environments (Hargittai, 2016).

In the context of educational equity, the relationship between digital literacy and disadvantage becomes evident. Disadvantaged groups encounter substantial obstacles in the development of robust digital literacy skills. The lack of proficiency in digital literacy skills limits these learners' ability to effectively use, assess, and utilize online educational materials. This limitation has a domino effect, hindering their educational advancement and reinforcing the cycle of educational disparities (Smith & López, 2020). Unveiling the layers of this challenge, one might encounter navigational difficulties posed by online learning platforms. These platforms encompass complex interfaces, intricate resource access routes, and engagement with multimedia content. For disadvantaged learners who lack adequate digital literacy skills, these tasks can quickly become overwhelming obstacles, resulting in difficulties finding content, limited engagement in discussions, and incomplete assignment submissions (Ali & Leeds, 2009a).

In line with navigation, the act of effectively engaging with digital content requires a craft in file interactions such as downloading, uploading, and maneuvering through files. Limited digital literacy skills can manifest as obstacles, presenting themselves in the guise of challenges related to opening documents, intricacies in submitting assignments, or the proficient utilization of collaborative tools. Consequently, these issues noticeably diminish the overall quality of the learning experience. (Levin & Waugh, 2013). Moreover, the domain of online communication becomes another arena of concern when considering the constraints caused by limited digital literacy skills. Proficiency in digital communication tools is a prerequisite for meaningful participation in online discussions and interactions. Yet, disadvantaged learners' unfamiliarity with these tools can trigger challenges in articulating thoughts, responding to peers, and collaboratively engaging in group projects (Warschauer, 2003).

The necessity for proactive skill development surfaces as an imperative within this context. Disadvantaged learners, frequently trapped within technology-deprived environments and devoid of formal digital literacy training, stand at the peak of a digital divide (Mtebe & Raphael, 2018). The gap between their existing skills and the necessary digital competency for successful online learning expands, further amplifying inequality. Among these challenges, the role of educational institutions and instructors takes center stage. Reducing the barriers posed by limited digital literacy skills demands a multifaceted approach. Incorporating digital literacy training as a facet of course orientations, extending tutorials on platform navigation, and furnishing lucid instructions on the utilization of digital tools are all pivotal in empowering disadvantaged learners to overcome these obstacles (Taylor & Francis, 2017a). The recognition of this challenge and the subsequent implementation of targeted strategies for enhancing digital literacy has significant importance. This not only ensures that online learning remains an instrument of equitable educational access but also empowers marginalized learners to immerse themselves fully and effectively within the digital learning landscape.

b. Socioeconomic Constraints

The rise of distance education has unfolded a tapestry of new educational possibilities, promising learning beyond the walls of traditional classrooms. Yet, in the pursuit of achieving educational inclusivity, the widespread influence of socioeconomic limitations significantly impacts the aspirations of disadvantaged groups striving to engage in this learning mode. The complex domain of socioeconomic factors involves financial restrictions and economic inequalities that construct significant obstacles to obtaining essential resources necessary for meaningful involvement in distance education (Smith & Johnson, 2020). At the heart of this discussion lies the significant obstacle of financial constraints that cast a shadow over equitable technology access, particularly affecting disadvantaged groups, especially those originating from low-income backgrounds. The lack of financial resources often translates into an inability to acquire the technological tools requisite for participation. The financial burden, encompassing the costs of acquiring computers, laptops, or smartphones, coupled with the expenses linked to securing consistent internet connectivity, serves as a deterrent to learners seeking to immerse themselves in online learning environments (Jaggars, 2011).

Adding to this financial challenge is the difficulty in affording learning materials, a pivotal aspect of distance education. Despite the digitized accessibility of these materials through online platforms, it is important to recognize that disadvantaged groups may face difficulties in affording essential textbooks, course materials, and supplementary online resources (Darling-Hammond & Post, 2019). Economic limitations hinder their ability to acquire resources essential for enhancing their learning experiences, resulting in a notable disparity in educational engagement. However, beneath the surface of distance education's perceived cost-effectiveness lie concealed expenses, which present a complex challenge for disadvantaged learners. Unanticipated costs, including technology maintenance, data usage, and software subscriptions, can transform into substantial financial obstacles (Levin & Waugh, 2013). These hidden expenses, concealed within the appearance of convenience, possess the potential to disrupt the seamless flow of learning processes, thereby intensifying the already present socioeconomic barriers (Reardon, 2013).

Closely interconnected with these financial considerations is the delicate task of managing both time and finances. Numerous disadvantaged learners, often adult students, find themselves navigating the complicated interplay between their educational pursuits, work obligations, and family commitments. This balancing act requires them to allocate their time and resources thoughtfully, which in turn places added pressure on their already constrained financial circumstances (Perraton, 2000). The balance between pursuing education and addressing immediate economic needs becomes tense, leaving learners struggling with this dilemma. In terms of financial access, inadequate financial support emerges as a critical concern. Scholarships and financial aid options often remain frustratingly inaccessible for disadvantaged groups. The lack of scholarships and grants specifically designed for the distinctive needs of distance education intensifies the difficulties in overcoming economic obstacles to learning (Murnane, Willett, Bub, & McCartney, 2020).

Considering these challenges, educational institutions and policymakers assume pivotal roles in addressing the barrier of socioeconomic constraints. Subsidized technology provisions, the embrace of open educational resources (OER), the establishment of flexible payment options, and the expansion of scholarship opportunities emerge as potential strategies to alleviate the financial burden of disadvantaged learners (Perna, 2020; Levin & Waugh, 2013; Gandara & Bial, 2001). The recognition of these challenges and the implementation of strategic interventions to alleviate financial burdens have the potential to transform distance education into a pathway for equitable access.

e. Lack of Learning Support and Resources

Although promising to transcend the confines of traditional classrooms, with the digital revolution of distance education an alarming challenge emerges, which is the lack of learning support and resources - a challenge that disproportionately affects disadvantaged groups. A crucial aspect of this problem is the lack of support, which is a fundamental element, in traditional classrooms. Students who are at a disadvantage often struggle to find the guidance that's readily available, in physical schools. The intangible nature of platforms can make it difficult for them to quickly reach out to instructors hindering their ability to seek clarification, address uncertainties, or receive feedback (Darling-Hammond & Post, 2019; Mtebe & Raphael 2018).

Augmenting this challenge is the limited interaction with peers and instructors, which can turn distance education into a solitary experience for disadvantaged learners. The absence of real-time discussions and collaborative activities diminishes the development of a supportive learning community, often leaving these learners isolated (Vonderwell & Zachariah, 2005). The limited availability of tutoring services and academic support systems has a significant impact. Although these services are crucial for learners requiring extra help, disadvantaged students frequently lack access to tutoring or academic advisors who can provide clarifications, reinforce learning concepts, and address academic difficulties (Smith & Lopez, 2020; Ali & Leeds, 2009a).

Another challenge of learner support and services emerges in the form of barriers to peer interaction that are crucial for collaborative learning. Disadvantaged learners, particularly those with limited social networks, often find themselves struggling to form connections and engage in group activities. Factors such as time constraints or unfamiliarity with online communication tools can hinder their participation (Levin & Waugh, 2013). All these challenges underscore the importance of proactive strategies for addressing the lack of learning support and resources. Educational institutions hold the key, with virtual office hours, online discussion forums, and comprehensive orientations emerging as pivotal mechanisms to bridge the support gap and familiarize learners with the nuances of the virtual learning realm (Darity & Mullen, 2020; Vonderwell & Zachariah, 2005; DiMaggio & Hargittai, 2001). By acknowledging the significance of personalized guidance, nurturing peer interactions, and ensuring equitable access to materials and academic assistance, educational stakeholders hold the power to transform distance education into a supporter of inclusivity.

f. Language and Cultural Barriers

Distance education heralds a new era of expansive learning possibilities, liberating education from the traditional classroom boundaries. Nevertheless, the intricate challenge of language and cultural barriers presents a significant concern that disproportionately affects marginalized groups, impeding their deep involvement in online learning environments (Berge, 2006). This challenge, rooted in the complexity of language diversity and cultural differences, reveals a dilemma for marginalized learners.

One of the main concerns in this respect revolves around resource availability for individuals with diverse language backgrounds. Many students come from backgrounds where English or the primary language of instruction isn't their native tongue. The insufficiency of resources and content adapted to their languages curbs their comprehension and active engagement with online course materials. (Hodgson & McConnell, 2019). The linguistic division extends to communication, where differences in language give rise to ambiguity. Such discrepancies can result in misunderstandings and misinterpretations, particularly evident in asynchronous discussions where real-time interaction is lacking. This exacerbates the challenges associated with language (Levin & Waugh, 2013).

Equally important is the concern of cultural insensitivity in educational content. Online learning materials that neglect cultural diversity risk undermining the learning experience for disadvantaged learners. When faced with content detached from their cultural contexts, disengagement and hindered comprehension become likely outcomes (Taylor & Francis, 2017b). In addition, cultural barriers assume another facet in the lack of culturally relevant examples, analogies, and case studies within course materials. Disadvantaged students often struggle to establish connections with material that does not align with their real-life experiences. As a result, this disconnect hampers their understanding of concepts (Hodgson & McConnell, 2019).

To address these challenges, the path to solutions leads to educational institutions and course designers that play a pivotal role in overcoming the obstacles posed by language and cultural barriers. This entails adapting content to local contexts, integrating diverse viewpoints, and cultivating an atmosphere of cultural awareness. These strategies have the potential to not only increase engagement but also improve comprehension for marginalized learners. (Levin & Waugh, 2013; Waters, 2011; Brown & Brown, 2009). This transformative endeavor empowers learners who have been marginalized to overcome obstacles and embrace the possibilities offered by distance education.

g. Limited Motivation and Engagement

Within the transformative context of distance education, there exists a twofold commitment to flexibility and accessibility. However, concealed within this commitment is the obstacle of constrained motivation and engagement, a difficulty that disproportionately affects disadvantaged populations. This obstacle appears as a hindered impetus for active involvement in digital learning settings, ultimately leading to diminished educational achievements (Rovai, 2003). To begin with, one pivotal dimension of this challenge is the isolation that often accompanies distance education for disadvantaged learners. The camaraderie and peer interactions inherent in traditional classrooms become elusive, leading to a sense of detachment. This detachment, in turn, threatens the sense of belonging and community, factors that are known to fuel engagement (Dennen, 2011; Vonderwell & Zachariah, 2005). Another dimension is the absence of face-to-face accountability, a phenomenon catalyzed by the virtual nature of online learning. For disadvantaged learners, who may grapple with self-regulation and discipline, the absence of external monitoring and immediate feedback can exhaust their commitment to the learning journey. The challenge posed by this absence is magnified for those who are already disadvantaged (Taylor & Francis, 2017; Harasim, 2012).

Additionally, another aspect of this challenge for disadvantaged learners is the lack of support systems. Unlike, in on-campus settings distance education often lacks accessible mentors, academic advisors, and comprehensive learning materials. This can be particularly challenging for learners as they face difficulties in seeking assistance. As a result, the limited support available undermines their motivation and persistence creating a cycle that perpetuates these challenges (Mtebe & Raphael, 2018; Turner, González Canché, & Wenz-Gross, 2015). A significant contributor to the challenge of limited motivation and engagement is the lack of tangible rewards. Traditional classrooms often offer immediate reinforcements like grades, certificates, and in-person interactions that serve as motivational catalysts. The virtual realm of distance education, however, lacks these motivators, thereby diminishing the incentive for disadvantaged learners to fully engage (Murnane et al., 2020; Vonderwell & Zachariah, 2005).

To navigate these barriers, the path to fostering engagement and motivation requires strategic deliberation. The incorporation of interactive elements, such as group projects, peer assessments, and synchronous discussions, serves to cultivate a sense of community, thereby enhancing motivation. Moreover, the provision of regular communication, timely feedback, and well-articulated learning objectives become the key to sustaining learners' engagement (Mtebe & Raphael, 2018; Garrison & Vaughan, 2013). By understanding the paramount importance of cultivating a supportive learning community, interlacing interactive elements, and bestowing consistent feedback, educational stakeholders can contribute to inclusive access via online and distance learning.

h. Disconnection from Learning Communities

The issue of feeling disconnected from learning communities is an obstacle that is often felt strongly by disadvantaged groups. Although distance education provides flexibility and convenience, not being physically present on campus and having opportunities for interaction can lead to feelings of isolation. This ultimately undermines the sense of belonging and engagement that are crucial for learning (Shea &Bidjerano, 2010). At the heart of this challenge lies the absence of face-to-face interactions, which traditional classrooms offer in abundance. The interactions among peers and instructors not only enrich the learning process but also foster a sense of community (Shea et al., 2010; Garrison, Anderson, & Archer, 2000). Yet, disadvantaged learners, traversing the virtual corridors of distance education, often find themselves bereft of these vital interactions. The outcome is a palpable sense of isolation, detachment, and a yearning for the social support that conventional classrooms inherently provide (Vonderwell & Zachariah, 2005).

The web of detachment expands even more, entwining itself around the constraints of limited networking opportunities. Beyond knowledge acquisition, education is also a bridge to a network that can shape academic and professional trajectories (Turner, González Canché & Wenz-Gross; 2015). Disadvantaged learners, dealing with socioeconomic limitations, find these opportunities elusive, further widening the gap in networking events, mentorship connections, and collaborative endeavors that could potentially enhance their academic growth (Taylor & Francis, 2017a). Moreover, disadvantaged learners can distinctly feel the absence of informal mentorship and guidance often intrinsic to on-campus environments. The personal interactions that facilitate academic advice, career guidance, and emotional support are often distant dreams in the realm of virtual learning. This can deprive learners of a crucial support system that could aid them in navigating the complexities of education and life (Perna, 2020; Darling-Hammond & Post, 2019). Besides, in the collective environment of learning, shared experiences, and diverse viewpoints are interwoven to create a mosaic of deeper comprehension. However, disadvantaged learners, distant from the shared physical spaces, may miss out on these chances. The absence of collective learning experiences can hinder their ability to develop a holistic understanding of subjects and to appreciate the richness that differing perspectives bring (Levin & Waugh, 2013).

To bridge this detachment gap for disadvantaged individuals, virtual discussion forums and synchronous sessions can mimic the essence of classroom debates, fostering a sense of community even in the virtual world. Collaborative projects, driven by technology, can create bonds among learners that mirror the camaraderie of on-campus teamwork. Additionally, educational institutions can proactively establish online mentorship programs and networking platforms, deliberately fostering connections that otherwise might not evolve (Anderson, 2008; Shia, Li & Pickett, 2006; Vonderwell & Zachariah, 2005). By recognizing the pivotal role of social interactions, forging pathways to virtual networking, and nurturing mentorship opportunities, educational stakeholders can ensure that distance education transcends its physical limitations. It, thus, transforms online learning into a conduit for inclusive education, empowering marginalized learners through their learning journey.

ENHANCING ACCESS AND ENGAGEMENT IN OPEN AND DISTANCE LEARNING THROUGH UNIVERSAL DESIGN FOR LEARNING

Open and distance learning has gained prominence in contemporary education, offering flexibility and accessibility to diverse learners (Peters, 2009). However, in an era characterized by varied learner profiles, including differences

in abilities, backgrounds, and preferences, the need for inclusive educational design is paramount. Universal Design for Learning (UDL), initially rooted in the field of special education but with broader applications, presents a compelling framework to address these challenges (CAST, 2018). It is an educational framework that is instrumental in creating inclusive learning environments and catering to the diverse needs of all learners, including disadvantaged groups (Rose & Meyer, 2002). UDL principles serve to support these disadvantaged groups by dismantling barriers to education, enhancing engagement, and fostering equitable learning experiences (CAST, 2018). Universal Design for Learning is highly compatible with open and distance learning, as it promotes the creation of accessible, engaging, and flexible online educational experiences.

A core principle of UDL is the provision of multiple means of representing content (Rose & Meyer, 2002). Within the context of open and distance learning, this translates into the utilization of diverse formats for course materials, including text, audio, video, and interactive simulations. This approach accommodates the varying learning preferences of online learners (CAST, 2018). For instance, a student with a visual impairment might rely on audio content, while another student who prefers visual learning can benefit from video presentations. This adaptable approach ensures that learners can access course materials in ways that align with their individual needs and learning styles, thereby promoting a sense of inclusivity and engagement.

UDL also emphasizes affording learners' multiple avenues for expressing their understanding and knowledge (Meyer & Rose, 2005). In the online learning environment, this implies allowing students to choose from a range of options for demonstrating their mastery of the subject matter. This inclusivity extends to students with diverse communication abilities or preferences. For example, a student may excel in conveying their understanding through written assignments, while another may prefer to articulate their insights in a video presentation or through interactive multimedia. By providing these alternative means of expression, open and distance learning becomes more accessible and equitable, as students can select the mode that best suits their abilities and strengths.

Another core UDL principle is the provision of varied means for engaging with learning materials and activities (CAST, 2018). In the realm of open and distance learning, this necessitates offering a spectrum of options, including asynchronous discussion forums, collaborative projects, self-paced modules, and synchronous webinars. Such diversification of engagement opportunities aligns with the recognition that learners have distinct preferences and learning styles, thus making the learning experience more accessible and engaging for a broader array of learners. Students can choose the mode of engagement that resonates with their preferences and circumstances, enhancing their motivation and commitment to learning.

UDL's commitment to personalized learning experiences is of particular relevance in open and distance education settings (Rose & Meyer, 2002). Personalization can be achieved by enabling learners to select their unique pathways through course content, perhaps facilitated through adaptive learning platforms or the availability of a variety of resources and assessment options. This approach acknowledges that open and distance learning often caters to a diverse audience with varying backgrounds, prior knowledge levels, and learning objectives. Through customizable learning pathways, educators can ensure that each learner receives an education tailored to their individual needs, promoting success and inclusivity.

A fundamental aspect of UDL is accessible design, which entails the creation of educational materials and online platforms that are usable by individuals with disabilities (Burgstahler, 2015). In the context of open and distance learning, this involves careful consideration of accessibility features such as screen reader compatibility, captioning, keyboard navigation, and other elements that ensure learners with disabilities can participate fully in the online educational experience. This commitment to accessible design not only aligns with principles of equity but also contributes to creating a more inclusive learning environment for all students.

CONCLUSION

In the pursuit of fostering equitable educational access and promoting inclusivity, the challenges of distance education for disadvantaged groups have emerged as focal points of concern. This paper has extensively explored the multifaceted barriers faced by marginalized populations in the realm of online learning, drawing insights from a range of academic literature. As evidenced by the research, challenges such as limited digital literacy, socioeconomic constraints, language, and cultural barriers, lack of learning support and resources, limited motivation and engagement, and disconnection from learning communities collectively hinder the realization of equitable educational opportunities for these groups.

The disadvantaged group is a broad term encompassing various categories such as socioeconomic status, disabilities, linguistic background, etc. This paper, thus, might not adequately capture the nuances of each group's experiences. Besides, although highlighting drawbacks is valuable, a paper should ideally also propose potential

solutions or strategies for mitigating these drawbacks. So, focusing solely on the problems of ODL for disadvantaged groups without offering guidance on improvement might limit the paper's practical applicability.

Addressing these challenges emphasized in this paper demands a holistic approach that transcends technological solutions. It necessitates the collaboration of educational institutions, policymakers, instructors, and stakeholders to develop multifaceted strategies that consider the interplay of socioeconomic, cultural, and pedagogical factors. By enhancing digital literacy training, expanding financial aid options, localizing content, fostering cultural sensitivity, and creating supportive virtual communities, educational stakeholders can mitigate these challenges and pave the way for disadvantaged learners to engage fully and effectively in distance education.

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Ethical Considerations in Instructional Design Enhanced by Artificial Intelligence: A Systematic Literature Review

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Abstract
This systematic literature review explores the ethical considerations and challenges instructional designers face when integrating artificial intelligence (AI) into the instructional design process for adult learners. Using the Technological Pedagogical Content Knowledge (TPACK) framework to examine the relationship of ethics, pedagogy, and technology in educational contexts, considering the increasing usage of AI. Synthesizing data from peer-reviewed publications, qualitative research, and theoretical papers, the review examines the evolution and application of AI-driven instructional technologies, the ethical issues encountered, and how they affect the educational experiences of adult learners. Crucial topics identified include balancing ethical standards with technological advancements, ensuring learner privacy and data security, and mitigating biases in AI algorithms. The results highlight the need for transparency in AI applications and the ongoing need for professional growth to successfully negotiate the changing ethical environment. This review highlights significant gaps in the literature, including the lack of comprehensive ethical frameworks tailored for AI in adult education, the scarcity of long-term empirical studies on AI's impact, and the need for practical implementation strategies for instructional designers. Addressing these gaps is essential for enhancing the quality and integrity of AI-enhanced adult education. By focusing on stronger ethical frameworks and coordinated efforts among educators, technologists, and policymakers, this review intends to improve the quality and integrity of AI-enhanced adult learning.
Keywords: Artificial intelligence, ethics, ethical considerations, instructional technology

Introduction

The incorporation of AI into educational practices has the potential to transform instructional design, especially for adult learners with unique experiences and needs (Nguyen et al., 2023; Souli et al., 2024). As AI becomes more embedded in educational contexts, it is essential to study the ethical considerations and challenges that instructional designers confront in this changing environment (Chan, 2023; Dagman & de Licht, 2024). The purpose of this systematic literature review is to examine the ethical considerations surrounding AI-driven instructional technologies and their effects on the educational experiences of adult learners. This analysis will be conducted within the Technological Pedagogical Content Knowledge (TPACK) framework (Mishra & Koehler, 2006; Koehler et al., 2013).

Given their diverse backgrounds and unique learning requirements, ethical considerations must be considered when integrating AI into the instructional design process for adult learners (Chan & Hu, 2023). This review synthesizes data from various sources, such as theoretical papers, peer-reviewed articles, and qualitative studies, to offer a thorough analysis of the integration of AI in instructional design. Relevant issues covered in this study include the advancement and usage of instructional tools powered by AI, ethical challenges experienced by instructional designers, and the wider consequences for adult education (Holmes et al., 2023; Mouta et al., 2023).

The research identifies several significant themes, underscoring the critical need to balance technological advancements and ethical standards. This balance is essential to protect student privacy and data security, address potential algorithm biases, and ensure learner and educator autonomy in decision-making (Ferrara, 2024; Karan & Angadi, 2023; Mhlambi & Tiribelli, 2023). It is this delicate equilibrium that will pave the way for a responsible and ethical integration of AI in instructional design. The review emphasizes the importance of transparency in AI applications and ongoing professional development for instructional designers to effectively negotiate the ethical difficulties involved with AI (Nguyen et al., 2023; Holmes et al., 2023). Moreover, it underscores the value of including ethical considerations throughout the design and implementation processes to ensure the equitable and accountable deployment of AI in education (Chan, 2023).

Given the unique experiences and needs of adult learners, it is crucial to develop comprehensive ethical frameworks tailored to this demographic (Nguyen et al., 2023). The literature lacks empirical studies on the long-term impact of AI on adult learners, diverse cultural and socioeconomic contexts, and practical implementation

strategies for instructional designers (Ferrara, 2024; Karan & Angadi, 2023). This review aims to highlight these gaps and underscore the importance of addressing them to ensure the responsible integration of AI in adult education (Becker et al., 2023; Ortega-Bolaños et al., 2024).

This review strives to contribute to academic discussion while offering practical insights for instructional designers, educators, technologists, and policymakers (Holmes et al., 2023; Souli et al., 2024). By highlighting the importance of strong ethical frameworks and collaborative efforts, this study strives to improve the quality and integrity of adult education in the age of new and innovative technology. It highlights the importance of informed decision-making and responsible deployment of AI technology to enhance awareness of ethical aspects of AI integration and recommend areas for future study and development (Dagman & de Licht, 2024; Chan & Hu, 2023).

Review of Relevant Literature

Incorporating AI into education has shown great promise, particularly in enhancing instructional design and pedagogical methodologies. The rapid advancement of AI technology has generated new prospects for personalized learning and adaptable teaching methodologies, resulting in an increasing research focus on AI-enhanced education (Bates et al., 2020; Bearman et al., 2023; Strzelecki, 2024). It is critical to address the ethical issues linked to the use of AI in instructional design, particularly for adult learners who have different experiences and demands in the learning environment (Bond et al., 2024; Ferrara, 2024; Khreisat et al., 2024).

TPACK Framework and Ethical Considerations

Mishra and Koehler (2006) established the Technological Pedagogical Content Knowledge (TPACK) framework, which offers a helpful viewpoint on integrating technology, pedagogy, and topic knowledge into education. This approach is useful in comprehending the ethical implications of AI-enhanced instructional design, since it promotes a balanced interaction between these three areas of knowledge. In addition, the TPACK framework highlights the significance of aligning technological integration with pedagogical objectives and content accuracy, ensuring that ethical considerations are appropriately addressed in the pursuit of educational innovation.

Technological Knowledge (TK)

Technological Knowledge (TK) involves a thorough understanding of AI technologies' capabilities and limitations. It is crucial for instructional designers and educators to have an in-depth understanding of how AI systems collect, analyze, and leverage data. A firm grasp of AI's capabilities and limitations will help address ethical concerns like data privacy and algorithmic bias. Recognizing the potential for AI algorithms to inadvertently perpetuate biases enables educators to establish safeguards and promote more equitable AI applications (Ferrara, 2024; Karan & Angadi, 2023). In addition, it is crucial to prioritize data privacy, especially considering that adult learners may not be familiar with intricate data procedures. This highlights the importance of transparency and trust in educational institutions (Tzimas & Demetriadis, 2021).

Pedagogical Knowledge (PK)

Pedagogical Knowledge (PK) consists of teaching methods and instructional strategies. The application of AI to enhance tailored instruction raises important ethical considerations, particularly in relation to learner autonomy. The potential of AI to customize educational experiences according to individual needs must be balanced with the need to preserve learner autonomy (Chan, 2023; Mhlambi & Tiribelli, 2023). It is crucial to ensure that AI applications do not compromise the self-directed nature of adult learning. It is crucial to prioritize the development of AI tools that promote inclusive and equitable education practices in order to uphold an ethical pedagogical approach (Bond et al., 2024; Khreisat et al., 2024).

Content Knowledge (CK)

Having a deep understanding of the subject matter and adhering to ethical practices are essential for achieving proficiency in Content Knowledge (CK) when using AI to enhance content delivery. Ensuring content accuracy and impartiality is crucial since AI-driven educational content must be impartial and adapted to the requirements of varied learners. Effective ethical content design requires careful consideration of how AI algorithms generate and present information to prevent misinformation and promote educational fairness (Chen et al., 2023; Ntoutsi et al., 2020).

Gaps in the Literature

Although considerable research has been conducted on AI in education, there are still notable gaps that need to be addressed. Comprehensive ethical frameworks tailored to AI in adult education are absent, as are empirical studies examining the long-term effects of AI on adult learners (Nguyen et al., 2023; Souli et al., 2024). These studies are vital for gaining insights into the long-term impact of AI technologies on adult learners in various academic settings.

In addition, numerous studies fail to sufficiently account for the wide range of cultural and socioeconomic backgrounds among adult learners (Ferrara, 2024; Karan & Angadi, 2023). Many studies fail to adequately address the impact of these factors on the ethical considerations and effectiveness of AI integration in education. Addressing this gap is crucial to developing inclusive AI-driven instructional designs that meet the needs of all adult learners.

Additional research is needed to explore the practical implementation strategies for instructional designers and the effectiveness of professional development programs in addressing ethical issues (Becker et al., 2023; Ortega-Bolaños et al., 2024). There is a need to conduct research that offers clear guidelines and assesses professional development programs to ensure they equip instructional designers with the essential skills to address ethical challenges in AI. Furthermore, these strategies must be flexible and able to keep up with the ever-changing AI technologies. This will help instructional designers maintain their expertise and ethical standards as they face new challenges.

In addition, there is a lack of research in the areas where AI intersects with established pedagogical theories and the ethical considerations of AI data usage (Nguyen et al., 2023; Holmes et al., 2023). Crucially, looking at how artificial intelligence may be included in frameworks like TPACK while maintaining ethical standards is vital. Furthermore, research is needed on the ethical management of AI-generated data to protect student confidentiality and prevent misuse.

Conclusion

Integrating AI into the instructional design process conveys enormous potential for improving education, especially for adult learners. It is crucial to prioritize ethical considerations to ensure that new technologies enhance educational experiences rather than compromise them. Incorporating the TPACK framework into ethical discussions offers a comprehensive approach to comprehending and navigating these challenges.

This systematic literature review has identified several significant gaps in the existing research. More specifically, there is a noticeable gap in robust ethical frameworks specifically designed for artificial intelligence in the context of adult education. Furthermore, there is a lack of empirical research examining the long-term effects of AI on adult learners, as well as a scarcity of studies that consider varied cultural and socioeconomic circumstances. Additional research is needed to explore the practical implementation strategies for instructional designers and the effectiveness of professional development programs in addressing ethical issues (Becker et al., 2023; Ortega-Bolaños et al., 2024). Research is needed that offers clear guidelines and evaluates professional development initiatives to ensure they equip instructional designers with the essential skills to address ethical challenges in AI.

Furthermore, there is a need for further research in the areas where AI intersects with established pedagogical theories and the ethical implications of AI data usage. The existence of these gaps highlights the need for targeted research that addresses the specific difficulties encountered by adult learners in AI-enhanced educational environments. It is important to consider the development of AI systems that are adaptive and culturally responsive in order to effectively meet the diverse needs of adult learners.

This review seeks to enhance the quality and integrity of AI-enhanced adult learning by highlighting the significance of strong ethical frameworks and collaborative efforts among educators, technologists, and policymakers. Future studies should focus on developing tailored ethical guidelines, evaluating the effectiveness of current frameworks, and investigating methods to promote inclusive and equitable integration of AI in education. It is essential to address these gaps to promote responsible AI usage that respects the privacy, autonomy, and diverse needs of adult learners. This will ultimately contribute to more effective and ethically sound educational practices.

Enhanced Professional Development Recommendations:

Key recommendations for professional development have emerged to address ethical challenges in AI integration in education. In the initial phase, it is crucial to develop thorough and ethically sound AI training programs. These training and development programs should focus on the ethical application of AI in education, encompassing key ethical concepts, case studies of ethical considerations, and successful ways of tackling common ethical challenges. In this regard, a certification course titled "Ethical AI in Education" could be created, concentrating on issues involving data privacy, algorithmic bias, and ethical decision-making frameworks.

Addressing ethical challenges in AI integration in education requires a collaborative approach. Educators, technologists, ethicists, and legal professionals each bring their unique expertise to the table. Interdisciplinary workshops and seminars are key in promoting this collaboration and the exchange of effective strategies. An illustration of this would be establishing an annual seminar titled "AI Ethics in Education: Challenges and

Solutions." This series would showcase experts from many disciplines and incorporate interactive breakout sessions to foster conversation and the formulation of solutions.

Another important recommendation is to include ethical AI training in the ongoing professional development (CPD) requirements for educators and instructional designers. It is vital that these professionals stay current with the latest ethical guidelines and technological advancements. Providing CPD credits for certified ethical AI courses and seminars would help maintain professional certification and ensure continued expertise in navigating the challenges of integrating AI into the instructional environment.

Creating mentorship programs and peer support networks can also offer valuable guidance and support for educators and instructional designers who encounter ethical dilemmas. Experienced mentors could offer valuable insights from their experiences with AI in education, assisting new members in effectively understanding and addressing ethical concerns. An experienced instructional designer might give advice and share helpful materials with their less experienced colleagues through a peer mentoring network, which would be highly advantageous.

Another key recommendation is to establish online resource centers dedicated to ethical AI. These centers should provide access to up-to-date research, ethical guidelines, best practices, and training materials on AI in education. The development of an online platform, like the "Ethical AI in Education Hub," can offer professionals a variety of resources such as white papers, toolkits, webinars, and a discussion forum. This enables the exchange of ideas and encourages engaging discussions.

Finally, implementing regular ethics audits for instructional designers and educators can help them assess the ethical implications of their AI-driven tools and practices. These audits should be well-structured and offer helpful feedback on areas that can be enhanced. Instructional designers might evaluate their AI tools using an annual ethics audit checklist and improve to meet ethical standards.

Implementing these recommendations will enable instructional designers and educators to successfully address the ethical challenges of incorporating AI into education (Adams et al., 2023; Becker et al., 2023). Nevertheless, the existing research highlights several gaps in the discussion. Thorough research is lacking that assesses the effectiveness of existing ethical frameworks specifically designed for adult learners. Furthermore, further investigation is needed to develop strategies that effectively address the unique challenges experienced by adult learners in AI-enhanced educational settings. Existing frameworks frequently neglect the unique needs of adult learners, highlighting the need for tailored ethical guidelines to ensure fair and inclusive educational procedures (Becker et al., 2023; Ortega-Bolaños et al., 2024).

This review seeks to make a valuable contribution to academic discussions while also offering practical insights for instructional designers, educators, technologists, and policymakers. The intent of this literature review is to enhance the standard and honesty of adult education in the digital age by highlighting the importance of strong ethical frameworks and collaborative activities. Through ethically sound AI deployment and informed decision-making in educational contexts, this review is intended to broaden understanding of the ethical considerations of AI integration and identify areas that necessitate additional research and investigation.

Methodology

Research Design

This systematic literature review explores the ethical considerations and challenges associated with integrating AI in instructional design for adult learners. Ethical frameworks are analyzed and evaluated to determine their strengths and flaws and uncover research gaps. Providing useful insights for educators, technologists, legislators, and instructional designers may assist in enhancing the ethical application of artificial intelligence in educational settings (Mishra & Koehler, 2006; Nguyen et al., 2023).

This systematic literature review aims to thoroughly examine the ethical considerations and challenges related to integrating AI into instructional design for adult learners. A set of specific research questions guides it. These questions seek to explore the unique perspectives of instructional designers, examine the ethical challenges encountered with AI technologies, and evaluate the application of theoretical frameworks such as TPACK. By addressing these questions, the study aims to fully understand how AI may be ethically and effectively integrated into adult education while preserving technical progress and educational integrity. The research questions guiding this review are as follows:

1. What are the reported experiences and challenges faced by instructional designers when integrating AI into instructional design for adult learners?

2. What ethical challenges related to data privacy, algorithmic bias, and learner autonomy are highlighted in the literature on AI-enhanced instructional design for adult learners, and how are they being addressed?
3. How has the TPACK framework been applied in the context of AI-enhanced instructional design for adult learners, and what are the reported outcomes?
4. What strategies are documented in the literature for balancing AI technology integration, pedagogical quality, and content accuracy in the design of adult education courses?
5. What ethical guidelines for AI in instructional design are discussed in the literature, and how do they impact the motivation and utilization of AI technologies in adult education?

Database Search

A comprehensive search was conducted across several academic databases accessible through the Jerry Falwell Library at Liberty University, including ERIC, EBSCO Quick Search, JSTOR, and ProQuest. Additionally, the EBSCO eBook collection, eBook Central in ProQuest, and Google Scholar were used to ensure a thorough search. The search was restricted to peer-reviewed articles published between 2019 and 2024, available in full text, and published in English.

Initially, broad search terms were identified based on key concepts related to the research questions to ensure a comprehensive search. These terms included "Artificial Intelligence in education," "ethical considerations," "instructional design," "adult learners," and "TPACK framework." Recognizing the diverse terminology used in the literature, synonyms and variations for each key concept were identified. For instance, "AI-driven learning technologies" and "intelligent tutoring systems" were used as synonyms for "Artificial Intelligence in education," and "data privacy," "algorithmic bias," and "transparency in AI" were used for "ethical considerations."

Search terms were combined using Boolean operators (AND, OR) to ensure effective results. As an illustration, the search was refined by using "Artificial Intelligence in education" AND "ethical considerations" to ensure relevance. Additionally, synonyms and variations such as "AI in instructional design" OR "AI-driven learning technologies" were included to ensure thoroughness. The search phrases and combinations were optimized repeatedly using pilot searches and feedback loops. If a search for "AI in adult education" generated too many irrelevant results, it was coupled with more specific terms such as "ethical considerations" or "data privacy."

Each database's unique search options were used, and search terms were adjusted accordingly. ERIC and JSTOR used subject-specific thesaurus and indexing words, whereas ProQuest used sophisticated search tools such as proximity searching and wildcard characters. Furthermore, Boolean operators were used deliberately to narrow search results, ensuring the search was thorough and focused on relevant research.

Inclusion and Exclusion Criteria

Certain inclusion and exclusion criteria were used to ensure relevance and quality. The inclusion criteria specified that research findings needed to be peer-reviewed academic articles focusing on instructional designers in higher education. These articles should also discuss AI technology and ethical issues in adult education. Furthermore, they should have been published in English between 2019 and 2024. Studies were excluded that were not peer-reviewed, unrelated to AI in education, conducted in non-educational settings, involving non-adult learners, or unavailable in full text online.

Data Extraction

The data extraction process was carried out with great attention to detail and a systematic approach, involving multiple steps to ensure precise and consistent results. Data were extracted from each study using a standardized data extraction form, capturing fields such as study ID, title, authors, year of publication, study objectives, population (adult learners), AI technologies used, ethical considerations discussed, theoretical frameworks (e.g., TPACK), key findings, and limitations. On this form, the fields for population and theoretical framework were both pre-selected to reflect that only adult learners were used in this research and that TPACK was the framework used as the foundation for this study. This standardized approach allowed for efficient organization and data comparison from various studies. This approach facilitated an exhaustive summary of findings, ensuring that all important information was considered.

Following the initial extraction, a thorough self-verification process was conducted. This involved carefully reviewing the extracted data compared to the original studies to identify and address any discrepancies. The extracted data were also compared with established guidelines and frameworks relevant to AI in education and ethical considerations, including the TPACK framework and other ethical principles in AI usage. In addition, this step ensured a consistent interpretation and reporting of ethical considerations and AI applications across various studies.

Although I was the sole reviewer, seeking input from colleagues or advisors added another level of review, which helped confirm the accuracy of the extracted data and resolve any inconsistencies. All discrepancies were carefully recorded, noting the specific details of each discrepancy and the actions taken to address and resolve them. A thorough review was conducted to ensure consistency and accuracy throughout the data collection.

Quality Assessment

The studies were evaluated using the Critical Appraisal Skills Programme (CASP) checklists to determine their quality. This systematic strategy ensured a consistent evaluation of each study's accuracy, relevance, and methodological quality. CASP is frequently used in qualitative research and systematic literature reviews to thoroughly evaluate studies, offering a strong framework for identifying the strengths and weaknesses in research methodology and reporting (Long et al., 2020).

Due to being the sole reviewer, the usual methods of assessing inter-rater reliability were not applicable. Instead, the quality assessment entailed doing a preliminary evaluation on a selection of articles using CASP checklists to detect and address any uncertainties in the appraisal criteria. Thorough documentation was kept for each study, including observations on how each study aligned with or deviated from appraisal criteria. Peer consultation was instrumental in receiving valuable feedback on the appraisal criteria and process. Reflective practice performed a key role in identifying and addressing any potential biases.

Data Synthesis

Braun and Clarke (2022) described thematic analysis as guiding the synthesis of qualitative data. The process started by becoming thoroughly familiar with the collected data. This involved reading and re-reading the articles, making initial notes, and recording potential themes. The Atlas.ti software enabled systematic coding of important features throughout the dataset, allowing for a thorough material analysis.

After the coding process, the various codes were grouped together into larger themes. The visual mapping tools available within Atlas.ti were used to effectively organize and streamline the thematic structure. The identified themes were carefully examined and improved to ensure they correctly represented the data and were relevant to the overall dataset. Precise definitions and names were established for each subject, enabling consistency and clear data representation.

Finally, a comprehensive report was created, using specific examples from the data to demonstrate each theme. In addition to providing insightful information about the ethical issues surrounding the integration of AI into instructional design for adult learners, this narrative offered a clear and compelling overview of the themes discovered during the study. The report effectively showcased the key findings by incorporating specific examples and case studies. Additionally, it provided valuable insights into the practical implications and real-world applications of these ethical considerations.

Results

Overview of Selected Studies

The final literature review included 42 articles with various focuses and scopes. Specifically, 5 studies addressed AI in education, 5 explored ethical considerations related to AI in education, 5 examined AI in education for adult learners, 6 discussed the TPACK framework and AI in education, 6 addressed AI-driven tools and technologies, 3 investigated data privacy, 3 investigated algorithmic bias, and 2 explored transparency issues. The research articles were published between 2019 and 2024, offering a current perspective on the subject matter. The study encompassed a variety of research methods, including qualitative, quantitative, mixed methods, and theoretical concept papers. The studies covered various locations including the United States, Europe, the Middle East, North Africa, and specific countries like Iran and Ghana. This variety enhances the depth and practicality of the research on ethical considerations in AI-enhanced instructional design.

Key Themes Identified

During the analysis of the selected studies, several key themes were identified, which closely align with the research questions and objectives of the systematic literature review. A predominant theme in the literature was the ethical considerations of AI, with several studies highlighting the value of ethical guidelines for integrating AI into educational environments. These principles included data privacy, algorithmic bias, transparency, and the need for ethical guidelines (Adams et al., 2023; Ahmad et al., 2023; Airaj, 2024; Aiken & Epstein, 2000; Ashok et al., 2022). These ethical considerations are crucial for ethical AI implementation and learner rights and privacy.

Another important issue was AI's transformative potential in education. Several articles explored AI's potential to enhance personalized learning, boost student engagement, and address the ethical and practical challenges

associated with the implementation of new technologies (Adiguzel et al., 2023; Bearman & Ajjawi, 2023; Bearman et al., 2023; Bates et al., 2020; Berendt et al., 2020). The studies emphasized the potential advantages of AI, including the ability to tailor learning experiences and enhance student involvement. This underscores the importance of maintaining a balance between innovation and ethical concerns.

The TPACK framework was a prominent topic of discussion. Multiple articles have examined the significance and practicality of incorporating technology into educational instruction and learning (Asamoah, 2019; Bagheri, 2020). The TPACK framework assists educators in understanding the effective integration of technology into their teaching practices, with a continued emphasis on pedagogy and content knowledge.

Another important theme explored was the unique obstacles and challenges adult learners encounter. The studies focused on various challenges adult learners face, including time constraints, financial difficulties, and the need to balance education with other responsibilities. The research also proposed strategies to provide support and assistance to these learners throughout their educational journey (Bellare et al., 2022). Addressing these challenges is crucial in developing AI-enhanced instructional materials that meet the specific requirements of adult learners.

The importance of AI literacy and pedagogical appropriateness was also emphasized in the literature. Ensuring that AI tools are designed and used in ways that are instructionally sound and ethically responsible is crucial *(*Adams et al., 2023; Akgun & Greenhow, 2022). It is imperative for educators to possess the necessary knowledge and skills to effectively and ethically adopt AI tools and technologies.

Many of the reviewed studies highlighted qualitative research methodologies. These methodologies, including thematic analysis and hermeneutic phenomenology, highlight the significance of comprehending the real-life experiences of instructional designers and learners (Alsaigh & Coyne, 2021; Braun & Clarke, 2019, 2023). These themes support the value of addressing ethical challenges, appreciating the unique needs of adult learners, and using strong qualitative techniques to obtain greater insight.

Specific Examples Illustrating Each Theme

Ethical considerations were a major focus in the literature. Adams et al. (2023) noted that "the study found that many core principles such as Transparency, Justice and Fairness, Non-maleficence, Responsibility, Privacy, Beneficence, and Freedom & Autonomy are adapted for children" (p.100131). Ashok et al. (2022) discussed "key ethical principles such as intelligibility, accountability, fairness, autonomy, and privacy" (P.102433). These studies emphasize the essential ethical principles required for the responsible incorporation of AI in education.

In their study, Adiguzel et al. (2023) conducted a thorough examination of the various ways in which ChatGPT, and similar AI technologies can be applied in the field of education. In a recent study conducted by Ahmad et al. (2023), noteworthy findings were uncovered regarding the adverse effects of AI. These adverse effects include a 68.9% increases in laziness, a 68.6% increase in privacy concerns, and a 27.7% decline in decision-making capabilities. The findings highlight the importance of carefully assessing the potential impacts of AI technologies in education.

Data privacy is another critical theme that was discussed in the literature. Ahmad et al. (2023) supported the implementation of proactive strategies and conscientious integration of artificial intelligence in education to address privacy concerns. Aiken and Epstein (2000) outlined "ten specific ethical principles for AI in education, such as avoiding information overload, promoting inquisitiveness, and respecting cultural diversity" (P.171). These studies highlight the need to protect learner data and implement secure data management strategies.

Baker and Hawn (2022) examined algorithmic bias, focusing on biases pertaining to race/ethnicity, gender, and nationality. The proposed framework for addressing algorithmic bias emphasized "recognizing and mitigating bias throughout the AI lifecycle, from data collection to deployment" (Baker and Hawn, 2022, p.1052). This theme highlights the importance of ensuring equitable educational outcomes through responsible application of AI.

The challenges and barriers faced by adult learners were discussed by Bellare et al. (2022) and Lin (2024). In their study, Bellare et al. (2022) identified several key themes that shed light on the experiences of adult learners. These themes encompassed various barriers that adult learners face, such as time constraints, financial concerns, and lack of preparedness. On the other hand, the study also highlighted motivations that drive adult learners, including career advancement, skill development, and personal fulfillment (Lin, 2024). The findings highlight the importance of creating learning environments that provide support and cater to the specific and unique needs of adult learners.

Asamoah (2019) expanded upon the TPACK framework by integrating "Ethics" and "Accomplishment" into the existing framework. Bagheri (2020) emphasized the need for ensuring that technological integration remains in line with pedagogical goals and content accuracy. These articles demonstrate the TPACK framework's relevance and value in incorporating technology into teaching and learning. Adams et al. (2023) emphasized the importance of transparency in their article, highlighting its open-access nature and broad accessibility. In their study, Becker et al. (2023) highlighted the significance of the Code of Digital Ethics (CoDE) as a valuable instrument for ethical contemplation, assessment, and decision-making. They emphasized that its implementation could contribute to increased transparency and trust with external collaborators. These results emphasize the need of transparency in AI usage in educational settings.

Sub-Themes Identified

Several sub-themes were identified within the main themes, offering a more nuanced understanding. Understanding and addressing biases in the AI lifecycle is crucial for promoting fair educational outcomes, as emphasized by Baker and Hawn (2022). Protecting learner data and ensuring secure data handling practices are critical, as discussed by Ahmad et al. (2023). Adams et al. (2023) emphasize the significance of transparent and responsible usage of AI in educational environments. Ashok et al. (2022) explored the topic of ethical frameworks specifically designed for educational settings.

Designing effective AI-enhanced instructional materials requires consideration of the various challenges and motivations of adult learners. This was specifically discussed by Bellare et al. (2022) and Lin (2024). Adiguzel et al. (2023) highlights the importance of providing educators with comprehensive training and support to successfully incorporate AI into their teaching practices. Ensuring AI tools align with educational goals without undermining the educational process is crucial, as highlighted by Adams et al. (2023).

The sub-themes presented here serve to expand upon the main themes and offer a broad framework for understanding the ethical aspects of AI-enhanced instructional design. This systematic approach allows an in-depth examination of how AI technologies might be responsibly and effectively incorporated into educational environments for adult learners. This framework ensures that the integration of AI in education promotes fairness, equity, and transparency by addressing specific ethical considerations, such as data privacy, algorithmic bias, and the balance between AI and human interaction.

Synthesis of Findings

The studies examined in this review focus on the ethical aspects of AI in instructional design for adult learners. They highlight the importance of transparency, fairness, privacy, and the establishment of ethical guidelines. For example, Adams et al. (2023) and Ashok et al. (2022) highlight the importance of transparency and accountability in AI applications, advocating for systems that are understandable and monitored by users. In their study, Ahmad et al. (2023) emphasizes the importance of data privacy and put forth strong measures for data protection. Baker and Hawn (2022) examine strategies to address algorithmic bias and promote fairness and equity. These ethical considerations are crucial for responsible AI integration in education.

Instructional designers often encounter a range of challenges, including ethical considerations like bias, data privacy, and the need for transparency, along with technical and implementation issues. To properly apply artificial intelligence technology, instructional designers also have challenges merging AI with pedagogical goals and need continuous development and support. In addition, they must navigate the intricate challenges of creating inclusive and equitable learning environments that effectively address the varied needs of adult learners. These challenges highlight the complexity of integrating AI into instructional design and the need for comprehensive strategies to address ethical, technical, and pedagogical issues.

The application of the TPACK framework in the context of AI-enhanced instructional design for adult learners has been discussed in several studies. Asamoah (2019) and Bagheri (2020) have found positive outcomes in their research. They discovered that educators' technological and pedagogical knowledge improved, leading to enhanced learning experiences for adult learners. These examples illustrate how the TPACK framework may effectively manage the incorporation of technology into teaching and learning, while also prioritizing pedagogy and topic knowledge.

The strategies outlined for achieving an effective integration of AI technology while upholding pedagogical excellence and accuracy involve prioritizing ethical principles and human-centered design, promoting professional development and collaboration, addressing algorithmic bias and ensuring fairness, customizing instructional approaches, safeguarding data privacy and security, incorporating theoretical frameworks like TPACK, and actively engaging learners to foster critical thinking. The strategies outlined here focus on achieving an orderly

integration of AI technologies while upholding rigorous pedagogical standards and ensuring content accuracy. In addition, they emphasize the importance of consistently evaluating and improving AI tools to keep up with changing educational needs and technological advancements.

The literature extensively addresses the ethical guidelines for AI in instructional design, covering transparency and accountability, privacy and data security, fairness and bias mitigation, and a focus on human-centric AI. The guidelines have a significant impact on the motivation and usage of AI technologies in adult education. They promote trust, address privacy concerns, ensure fairness, promote human-centric approaches, and enhance professional development. These guidelines encourage the effective and ethical use of AI tools, fostering a wider acceptance and integration of AI into adult learning contexts.

Gaps and Limitations

The selected studies have highlighted various gaps and limitations that need to be addressed. These include the absence of empirical studies examining the long-term effects of AI on adult learners, the importance of considering diverse cultural and socioeconomic contexts, the lack of practical implementation strategies for instructional designers, and the limited assessment of the effectiveness of professional development programs. In addition, there is a need for further exploration into the integration of AI with established pedagogical theories and the ethical implications of AI data usage. This article highlights the importance of addressing these gaps to gain a better understanding of the ethical considerations in AI-enhanced instructional design for adult learners. By doing so, we can work towards creating more effective and equitable educational practices.

Additional Insight

The selected literature revealed several surprising discoveries, including the positive effects of AI-driven tools on learner engagement and motivation, the widespread acceptance of AI among adult learners, and the varying approaches to addressing ethical concerns in different studies. This study enhances our understanding of the intricate process of incorporating AI into instructional design for adult learners. It also sheds light on specific areas that demand additional research and attention. In addition, the uneven availability of AI tools in various educational institutions highlights the importance of fair resource distribution to ensure that all learners can take advantage of AI advancements.

The findings of this review align with the existing literature on the topic, reinforcing the need for ethical frameworks, transparency, and rigorous methodological practices. The consistency of these themes across multiple studies suggests a shared understanding and approach to addressing the challenges and opportunities posed by AI in instructional design. By synthesizing these findings, this review provides valuable insights for educators, instructional designers, and policymakers, promoting responsible AI integration in education.

Discussion

Interpretation of Results

This systematic literature review uncovers various key themes and sub-themes related to integrating AI in instructional design, with a specific emphasis on ethical considerations for adult learners. After analyzing 42 articles, it became clear that ethical considerations play a crucial role in the responsible implementation of AI in educational contexts (Adams et al., 2023; Ahmad et al., 2023; Ashok et al., 2022). These considerations include data privacy, algorithmic bias, and transparency. The transformative potential of AI highlights the importance of maintaining a balance between innovation and ethical guidelines. This technology can personalize learning and enhance engagement, making it a powerful tool (Adiguzel et al., 2023; Bearman & Ajjawi, 2023; Berendt et al., 2020).

The TPACK framework's significance in AI-enhanced instructional design was confirmed, demonstrating the need for educators to effectively integrate technology with pedagogical and content knowledge (Asamoah, 2019; Bagheri, 2020). In addition, the challenges encountered by adult learners, such as balancing education with other obligations and financial limitations, highlight the importance of tailored support systems and AI tools that address these distinct barriers (Bellare et al., 2022; Lin, 2024). By addressing these issues with thoughtfully designed AI solutions, educational settings may become more accessible and inclusive, which will eventually improve adult learners' learning outcomes.

Implications of Findings

This review's findings indicate that incorporating AI into instructional design needs a robust ethical framework to safeguard learner rights and advance fair educational results. Adhering to ethical norms that prioritize transparency, fairness, privacy, and accountability is essential to minimize any adverse effects, such as heightened indolence, diminished decision-making abilities, and privacy concerns that have been highlighted in certain research (Ahmad

et al., 2023; Aiken & Epstein, 2000). In addition, these ethical standards have the potential to create a learning environment that is more trusting and productive. This, in turn, can lead to greater acceptance and effective application of AI technologies by educators and learners.

The favorable response to AI among adult learners and its ability to increase engagement and motivation suggest a promising chance for AI-driven tools to improve educational experiences (Ahmad et al., 2023; Adiguzel et al., 2023). Nonetheless, educators must engage in ongoing professional development to successfully incorporate and utilize AI technologies while upholding ethical standards (Adams et al., 2023; Akgun & Greenhow, 2022).

Contextualizing with Existing Research

The results are in alignment with existing literature that highlights the importance of ethical AI frameworks and the transformative power of AI in education. Research conducted by Bearman et al. (2023) and Berendt et al. (2020) supports the importance of ethical considerations and the transformative potential of AI in the field of education. Furthermore, it is essential to prioritize continuous professional development and training for educators to ensure the effective utilization of AI within the TPACK framework. This will help to maximize the benefits of AI while minimizing potential risks.

Addressing Research Questions

The research questions guiding this review are as follows:

1. What are the reported experiences and challenges faced by instructional designers when integrating AI into instructional design for adult learners?
2. What ethical challenges related to data privacy, algorithmic bias, and learner autonomy are highlighted in the literature on AI-enhanced instructional design for adult learners, and how are they being addressed?
3. How has the TPACK framework been applied in the context of AI-enhanced instructional design for adult learners, and what are the reported outcomes?
4. What strategies are documented in the literature for balancing AI technology integration, pedagogical quality, and content accuracy in the design of adult education courses?
5. What ethical guidelines for AI in instructional design are discussed in the literature, and how do they impact the motivation and utilization of AI technologies in adult education?

Research Question 1: Experiences and Challenges of Instructional Designers

Integrating AI into instructional design for adult learners poses several challenges that instructional designers must navigate. The challenges involved in this field include technical challenges, the need to align AI tools with pedagogical goals, and the necessity of addressing the unique needs of adult learners who often balance education with other responsibilities (Bearman & Ajjawi, 2023). The literature emphasizes the importance of instructional designers staying up-to-date with AI advancements and effectively integrating them into their work (Adiguzel et al., 2023). Furthermore, the wide range of AI tools and their functionalities pose a considerable challenge, requiring designers to possess the skill of choosing and adapting tools to suit educational settings (Ahmad et al., 2023).

Research Question 2: Ethical Challenges and Mitigation Strategies

The ethical challenges related to AI-enhanced instructional design are substantial and complicated. Data privacy concerns are of utmost importance, as indicated by numerous studies that underscore the need for strong data protection measures (Ahmad et al., 2023; Aiken & Epstein, 2000). Researchers have highlighted the significant concern of algorithmic bias, emphasizing that unfair educational outcomes can result from biases in AI algorithms (Baker & Hawn, 2022). The literature recommends the implementation of ethical frameworks that prioritize transparency, fairness, and accountability to address these challenges (Adams et al., 2023; Ashok et al., 2022). The authors suggest implementing strategies like conducting regular audits of AI systems and adopting inclusive data practices to address biases and promote fair treatment of all learners (Akgun & Greenhow, 2022).

Research Question 3: Application and Outcomes of the TPACK Framework

The TPACK framework has been effectively applied in AI-enhanced instructional design, showcasing its effectiveness in integrating technological, pedagogical, and content knowledge (Asamoah, 2019; Bagheri, 2020). The framework helps educators in understanding how they can incorporate AI tools in an approach that aligns with their pedagogical objectives and improves content delivery. The reported outcomes highlight the positive impact of the study, showcasing how educators have improved their technological proficiency and adult learners have had enhanced learning experiences (Bagheri, 2020). Research suggests that the TPACK framework is effective in finding an appropriate balance between technological integration and pedagogical effectiveness. TPACK ensures that AI tools are used to support educational objectives rather than hinder impede progress (Asamoah, 2019).

Research Question 4: Balancing AI Integration with Pedagogical Quality

A strategic approach that encompasses professional development, collaboration, and continuous evaluation is necessary to balance the integration of AI technology with pedagogical quality and content accuracy (Bearman et al., 2023; Berendt et al., 2020). The literature examines various strategies, which includes developing a culture of continuous development for educators, promoting collaboration between AI experts and instructional designers, and developing tailored instructional approaches that align with educational objectives (Bellare et al., 2022; Lin, 2024). Incorporating theoretical frameworks like TPACK is crucial to ensure that the integration of AI tools maintains pedagogical integrity and content accuracy (Bagheri, 2020).

Research Question 5: Ethical Guidelines and Their Impact

Establishing ethical principles for AI in instructional design is necessary to ensure proper technology implementation and foster positive educational outcomes. The guidelines discussed in the literature emphasize the importance of transparency, accountability, fairness, and privacy (Adams et al., 2023; Ashok et al., 2022). These guidelines have a significant impact on the motivation and application of AI technologies. They attempt to foster trust among educators and learners, address privacy concerns, and ensure equitable access to AI tools (Airaj, 2024). The literature suggests that adhering to ethical guidelines can result in greater acceptance and more effective integration of AI in educational environments, ultimately improving the learning experience for adult students (Adams et al., 2023).

Limitations of the Review

Despite the comprehensive nature of this review, several limitations should be acknowledged. First, the review focused solely on articles published between 2019 and 2024, which may have overlooked earlier studies that could have offered valuable historical context and longitudinal data. In addition, it is worth considering that the emphasis on English-language publications may have unintentionally overlooked valuable research conducted in non-English-speaking regions. Such research could provide a range of perspectives and valuable insights into the ethical implications of AI within various cultural and educational settings.

Another limitation is the inconsistency in how ethical considerations are addressed in different studies. While some studies thoroughly explored issues such as data privacy, algorithmic bias, and transparency, others merely touched upon these concerns without delving into detailed analysis or offering practical solutions. The lack of consistency in this situation emphasizes the importance of implementing standardized ethical guidelines and frameworks that can be universally applied. This will help ensure a consistent approach to integrating ethical AI in education.

Furthermore, the review heavily relied on qualitative research methodologies. Although these methodologies offer detailed and insightful information, they may not be as easily generalized as quantitative studies. The overemphasis on qualitative studies may have biased the findings towards subjective interpretations of ethical issues and instructional challenges, potentially overlooking broader trends that could be uncovered through quantitative research. In many of the qualitative studies, there is a reliance on self-reported data. This could introduce biases, as participants' perceptions and experiences may not fully capture the objective realities of AI integration in instructional settings.

Lastly, the evaluation lacked a thorough analysis of the implementation and practical application of suggested ethical frameworks in actual educational settings. Empirical studies are necessary to assess the practical usefulness of these frameworks. These studies should offer actionable insights and evidence-based suggestions for instructional designers and instructors. Considering these limitations in future research would improve the strength and relevance of the findings, leading to a deeper understanding of ethical AI integration in instructional design for adult learners.

Future Research Directions

Future research should focus on longitudinal studies to understand the long-term effects of AI on adult learners, especially regarding ethical considerations. Longitudinal research provides an in-depth understanding of how AI impacts learning pathways, cognitive development, and career outcomes over extended periods of time. These types of studies play a crucial role in uncovering the various outcomes of AI integration, enabling us to make informed decisions and develop effective practices and policies (Ahmad et al., 2023; Ashok et al., 2022).

In addition, it is crucial to conduct research that examines how AI can be integrated with established pedagogical theories. Integrating AI with frameworks like TPACK can provide valuable insights into developing technology-enhanced learning environments that uphold pedagogical integrity. It is important to recognize the potential of AI tools in enhancing the instructional design process and accommodating different learning styles, which can ultimately lead to a more inclusive and flexible education system (Asamoah, 2019; Bagheri, 2020). In addition,

exploring the relationship between AI technologies and traditional teaching methods can provide valuable insights into how AI can be used to improve critical thinking, problem-solving, and collaborative learning for adult learners.

It is important for research to explore the practical application of ethical guidelines in different educational settings. It is important to not only create strong ethical frameworks, but also to put them to the test in real-life situations to ensure their practicality and effectiveness. Research could explore a range of cultural and socioeconomic settings to gain insights into how contextual factors impact the ethical incorporation of AI in education (Aiken & Epstein, 2000; Airaj, 2024). Meanwhile, it is crucial to thoroughly examine the effectiveness of professional development programs in equipping educators with the necessary skills to integrate AI ethically.

Empirical studies are required to assess existing training programs, identify any deficiencies, and suggest enhancements. Professional development models like continuous learning and collaborative training could be examined to determine the best way to prepare educators for AI-enhanced instructional design (Adiguzel et al., 2023). Understanding how these programs may be adapted to adult learners' requirements and AI's ethical problems will enable educators to properly and successfully use AI tools.

By addressing these gaps, future research can help us gain a deeper understanding of how AI can be integrated into instructional design in a responsible and effective manner. By prioritizing the rights and well-being of all learners, we can ensure that technology is used in a way that promotes equitable and effective educational practices. This approach, supported by research (Bearman & Ajjawi, 2023; Berendt et al., 2020), will benefit students and safeguard their educational experience. Future research should explore methods to enhance the accessibility of AI technology for educational institutions that lack resources in order to address inequalities and foster educational fairness among diverse areas and populations (Bellare et al., 2022; Lin, 2024).

Conclusion

This systematic literature review (SLR) offers a thorough analysis of the ethical considerations surrounding AI-enhanced instructional design, specifically focused on adult learners. The review covered 42 articles that explored a wide range of topics, including ethical challenges, the use of AI in adult education, the application of the TPACK framework, and ways to balance AI technology with pedagogical quality. The findings emphasize the importance of robust ethical frameworks to ensure the responsible integration of AI, focusing on ethical standards such as transparency, fairness, privacy, and accountability (Adams et al., 2023; Ashok et al., 2022).

The review highlighted the considerable advantages of AI in education, including personalized learning and enhanced student engagement. It also underscored the ethical and practical hurdles of implementing AI (Adiguzel et al., 2023; Bearman & Ajjawi, 2023; Berendt et al., 2020). The TPACK framework has become a crucial tool in the integration of technology with pedagogical and content knowledge, highlighting its continued importance in AI-enhanced instructional design (Asamoah, 2019; Bagheri, 2020).

The research highlighted the unique challenges encountered by adult learners, including the need to balance education in conjunction with other responsibilities and financial limitations. Addressing these challenges through tailored support systems and AI tools is crucial for enhancing adult education (Bellare et al., 2022; Lin, 2024). The need of AI literacy and continuous professional growth for educators has been identified as essential criteria for effective AI integration (Adams et al., 2023; Akgun & Greenhow, 2022).

Despite the insights collected, this study has limitations, including concentrating on current literature (2019-2024) and relying solely on English-language publications, which may leave out valuable previous research and non-English viewpoints. In addition, the disparity in how ethical concerns are addressed in different studies highlights the importance of having standardized ethical guidelines. Furthermore, the emphasis on qualitative and theoretical research underscores the need for additional empirical studies to support the findings and establish a stronger evidence base for the ethical integration of AI in instructional design.

Future research should prioritize longitudinal studies to gain insight into the lasting effects of AI on adult learners, with a specific emphasis on ethical considerations. This field will be enriched by exploring the integration of AI with established pedagogical theories and the practical implementation of ethical guidelines in diverse educational contexts. Furthermore, it is crucial to assess the effectiveness of professional development programs in equipping educators with the requisite skills to incorporate AI (Adiguzel et al., 2023) ethically.

By addressing these gaps, future research has the potential to enhance our understanding of how AI can be integrated into instructional design in a responsible and effective manner. This will ensure that all learners can benefit from the technology while protecting their rights and well-being. This SLR provides a solid foundation for

the development of ethical frameworks and practical strategies to integrate AI into adult education. It aims to promote fairness, equity, and transparency in educational practices.

Recommendations

This systematic literature review highlights the importance of having comprehensive and standardized ethical guidelines for the integration of AI in education. The range of approaches in addressing ethical concerns across different studies underscores the significance of establishing precise guidelines that prioritize transparency, data privacy, fairness, and accountability. This set of guidelines will establish a cohesive structure for the ethical usage of AI in educational environments (Adams et al., 2023; Ahmad et al., 2023).

Also, extensive research that extends over time and relies on real-world data is important to fully understand the lasting effects of AI on adult learners and the adult learning process. While theoretical and qualitative studies provide valuable insights, empirical research is essential to validate these findings and offer a robust evidence base. Longitudinal studies can show how AI-driven instructional strategies affect adult learners over extended periods (Bellare et al., 2022; Lin, 2024). Further research is needed to explore the integration of AI with established pedagogical frameworks, like TPACK. Having a grasp on how AI can assist various teaching methods and accommodate different learning preferences is crucial for fostering inclusive and flexible educational settings. By examining the intersection of AI and pedagogy, future studies can offer valuable insights into technology-enhanced learning practices that uphold pedagogical integrity (Asamoah, 2019; Bagheri, 2020).

Continuing education for educators is essential for ensuring the ethical and efficient incorporation of AI into instructional design. Training programs should be designed to equip educators with the necessary skills to navigate the complexities of AI-enhanced learning environments. By engaging in continuous learning opportunities and participating in collaborative training sessions, educators and instructional systems designers can ensure they stay updated with the latest advancements in AI and ethical standards. This will greatly enhance their ability to responsibly integrate AI tools into their teaching practices (Adiguzel et al., 2023).

Focusing on future research and practice is crucial to effectively meeting the specific needs of adult learners. AI tools and instructional strategies should be customized to support adult learners in managing their educational pursuits and other life obligations. Research should prioritize the development of inclusive learning environments that address the unique challenges and motivations of adult learners, ensuring that AI-enhanced education is accessible and impactful (Bellare et al., 2022; Lin, 2024).

Ensuring data privacy and security is of utmost importance when it comes to ethically incorporating AI in education. Implementing strong privacy measures is crucial to safeguard learner data and foster confidence in AI systems. Implementing proactive strategies and conscientiously integrating AI technologies can effectively address privacy concerns, maintaining the security and ethical use of learner information (Ahmad et al., 2023; Aiken & Epstein, 2000). By implementing transparent data practices and conducting regular privacy audits, we can further enhance our security measures. This will reassure learners and educators that their data is handled with the utmost care and integrity.

It is crucial to address algorithmic bias to guarantee fair educational outcomes. It is essential to implement frameworks that can identify and address biases at every stage of the AI lifecycle. Consistently monitoring and fine-tuning AI systems can be crucial in mitigating biases associated with race, gender, and other demographic factors. This proactive approach fosters a sense of fairness and equality in AI-powered education (Baker & Hawn, 2022). Ultimately, these recommendations illustrate the importance of implementing broad and diverse strategies to promote the ethical integration of AI in instructional design. In order to create strong frameworks that can adapt to the changing landscape of AI in education, it will be essential to promote collaboration among educators, technologists, policymakers, and ethicists.

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Exploring High School Teacher and Student Engagement with the Wisdom. K12 Automated Writing Evaluation Tool in the Northeastern United States: A Multiple Intrinsic Case Study

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Abstract
The purpose of this multiple intrinsic case study was to describe how Northeastern United States middle school teachers and students engaged with a new automated writing evaluation tool used to score and provide feedback on extended essay assignments to improve teaching and learning writing. Richard Elmore's (1993) instructional core framework is the theory guiding this study. The study's central research question is: How do public and private middle school students and teachers engage with the automated writing evaluation program WisdomK12? The study leveraged an intrinsic case study design and triangulated data from educational artifacts, individual interviews, and questionnaires. Results indicated that students and teachers found WisdomK12 to save time, provide relevant, encouraging, and authentic feedback, and inspire them to write more. Implications and future research are discussed.
Keywords: writing, feedback, artificial intelligence, educational technology, automated writing evaluation, assessment, automatic assessment, text grading, extended essay assessment, automated grading

Overview

"I'm wary of having students use it to do their writing and then me use it to do the grading- just bots talking to bots" (Cardon et al., 2023, p. 272). This quote epitomizes the dilemma educators face everyday regarding when and how they should incorporate artificial intelligence (AI) into education. AI can enhance learning, but research also indicates it can inhibit learning (Cardon et al., 2023). Over the last 40 years, students' skills in writing, the second "r" in reading, writing, and arithmetic, have significantly declined (Vang et al., 2023). Teachers provide fewer opportunities for extended essays and have replaced rich and robust essay assignments with multiple-choice and short answers to save time. Consequently, students' critical thinking, reasoning, and creative skills have diminished (Giouroukakis et al., 2021). This study evaluated a program that could restore robust writing in the ELA curriculum by evaluating a new automated writing evaluation (AWE) tool called WisdomK12 at a public and parochial middle school in the northeastern United States.

Background

Writing has been an integral part of learning since the beginning of education. Over the ages, in the United States, writing was the third component of the foundations of education: reading, writing, and arithmetic. Writing improves critical thinking, logic, reasoning skills, and helps students organize thoughts, enhances ideation, improves research and revision skills (Langer, 1987). Extended writing fosters inquiry across multiple disciplines (Giouroukakis et al., 2021; Graham et al., 2018). Cross-disciplinary writing increases subject matter retention and transfer (National Commission on Writing, 2003). Writing skills improve college success, job opportunities, and advancement (National Commission on Writing, 2003). Teaching writing requires complex assignments that require reading, evaluating, and annotating articles (Vang et al., 2023). Writing may involve learning to use graphic organizers and outlines and building writing skills from short answers to longer, more intricate, and complex paragraphs and extended essays (Vang et al., 2023). Writing teaches students how to evaluate, paraphrase, and explain complex concepts and texts in simple terms and helps them structure arguments and communicate to convey knowledge (Langer, 1987; Vang, 2023). Extended essays and their assessment involving continuous feedback loops nurture deeper learning of all content in all disciplines, including history, math, and science (Gao, 2024).

Writing is an integral part of education, yet teachers have strayed from assigning extended essays over the years due to time constraints, lack of skills, and standards-driven pedagogy (Graham, 2019). High school English classes spend 6% of instructional time on writing strategies and models and 4% on evaluation and feedback (Vang, 2023). According to Graham (2019), teachers spend less than one hour daily on writing and provide no more than one or two extended writing assignments per year. Common Core State Standards (CCSS) emphasize paraphrasing and

informative text, which fosters short-answer responses. De-emphasizing extended essay writing marginalizes deep writing and critical thinking (Vang, 2023).

Langer (1997) contended that if teachers do not have confidence, education and background, and professional learning on best practices in writing, they will not have the confidence or skills to properly instruct and assess writing which in turn reduces the quantity and quality of writing instruction and evaluation. The problem is that students' writing skills are diminishing due to the lack of exposure to quality writing instruction and evaluation (Vang et al., 2023). Since so little time is now spent on extended writing, student success in college and their careers is in jeopardy. Our students' writing skills decline is evident in recent statistics from the Public Policy Institute of California (2023), which reported that 80% of all California community college students required writing remediation in 2023. According to the Center for American Progress (2023), the cost to remediate students in colleges in America is $1.3 billion. Consequently, 43 million Americans are illiterate (National Center for Education, World Atlas, 2023). This study aimed to explore and describe the responses of middle school teachers and students in the Northeastern United States regarding the implementation of WisdomK12, a new automated writing evaluation tool designed to score and provide continuous feedback on extended essay assignments.

Research Questions

The central research question addresses student and teacher experiences using WisdomK12, an AWE tool. The subsequent research questions (SRQs) delved deeper into student and teacher experiences using the tool to improve relationships, enhance writing skills, and minimize the time required to evaluate extended essays. Further, the research questions aimed to determine whether the students and teachers found the tool engaging and encouraging during the writing process.

Central Research Question

How do middle school teachers and students in the Northeastern United States describe their experiences using WisdomK12, a new automated writing evaluation tool designed to score and provide feedback on extended essay assignments?

Sub-Question One

How do middle school students and teachers in the Northeastern United States describe the quality of feedback from WisdomK12?

Sub-Question Two

How do Northeastern United States middle school students and teachers perceive their writing skills after using WisdomK12?

Sub-Question Three

How do Northeastern United States middle school students and teachers perceive student-teacher engagement after using WisdomK12?

LITERATURE REVIEW

Theoretical Framework

This study leveraged Richard Elmore's instructional core framework (ICF). Elmore extended ICF's roots in behaviorist and constructivist learning theories by focusing on the interdependent and harmonious relationships among teachers, students, and content. (City et al., 2009). The theory emphasizes student-centered learning and purports that any change in teacher, student, or content impacts one another (Elmore, 1993). ICF consists of seven pillars (Elmore, 2008). First, student learning increases with higher quality content, profound teacher subject matter knowledge, and student engagement. Second, ICF components are interdependent. Third, If components within ICF are unclear, they do not exist, and learning will not effectively or efficiently advance. Fourth, Student performance depends on the given task and how they execute these tasks. Fifth, observations and analysis drive accountability and assess whether the tasks have been completed. Sixth, students and teachers learn by doing. Finally, instruction should describe, analyze, predict, and evaluate.

Similar to Mishra and Koehler's (2006) (technological, pedagogical, and content knowledge (TPACK), ICF contends that teachers must have deep content and pedagogical knowledge to deliver lessons effectively and must be nimble to adjust to student's learning characteristics. ICF is also similar to TPACK in that each component is interdependent. The ICF, however, focuses more on the teacher-student dynamics and how challenging content can improve teaching and learning (City et al., 2009). Although TPACK infuses the technological knowledge component, this study aimed to leverage ICF to evaluate the relationship and engagement between the student,

teacher, and content when AWE becomes part of the teacher toolbox. The framework provided a lens to observe the interplay between teacher, student, and content with the advances in AWE. The framework offered guidance to understand pedagogical changes that WisdomK12 injected in writing instruction. Ultimately, this framework served as a foundation for understanding the interplay between students and teachers as they used WisdomK12 and underpinned WisdomK12's potential to improve teaching and learning through improved engagement and learning outcomes and student and teacher-improved efficacy.

Related Literature

The decline of writing education in the United States has been significantly influenced by the adoption of standards-driven curricula, such as Common Core, which have led to the decline in writing instruction. Instead of fostering critical thinking and creativity, many educators assign brief, formulaic responses, limiting students' opportunities for extended writing. Factors such as inadequate preservice teacher training and large class sizes exacerbate the issue as teachers struggle to provide substantive feedback on writing assignments. To address this decline, some educators and researchers are turning to automated writing evaluation (AWE) systems, which offer potential affordances such as fast feedback, increased student engagement, and personalized learning. However, the mixed results of AWE tools, particularly around feedback quality, accuracy, and critical thinking development, have sparked debates about their role in writing instruction. This section synthesizes the challenges and opportunities posed by AWE in reversing the current decline in writing education, considering its potential to enhance the writing process and its limitations in delivering meaningful, contextualized feedback.

Writing Education's Decline

Common core and standards-driven curricula have created the opposite of their intent of promoting critical and deeper thinking by minimizing writing assignments to multiple-choice and short answers (Vang et al., 2023). Efficacy, lack of preservice training, math/science writing training, and teacher efficacy have also hurt teachers' providing meaningful and robust extended essays (Graham, 2019). Further, how teachers approach writing is linear, limiting creativity (Benjamin & Wagner, 2021). The linear process in teaching writing excludes critical thinking, argument and persuasion, analysis, and synthesis of ideas and promotes monotony and repetition. Descriptive writing is becoming extinct. Common Core State Standards, lack of time to grade extended essays, and lack of teacher knowledge have all contributed to the decline in promoting quality writing.

Essential to quality revisions is the feedback loop (Langer, 1997). Fan and Ma (2022) contended that teachers no longer initiate a continuous feedback loop essential to revisions due to time constraints. Providing grammatical and mechanical feedback is not enough to provide quality writing instruction. Further, the feedback that studies show today gives is inconsistent, biased, and untimely (Benjamin & Wagner, 2021; Giouroukakis et al., 2021; Graham, 2019; Vang et al., 2024)

All these contribute to teacher reluctance to assign extended writing tasks and put a wedge between teachers, making learning robotic and dull, lacking critical thinking skills, minimizing creativity, marginalizing reasoning, and an overall decline in education. Evidence of the decline in writing is in the latest statistics from the Public Policy Institute of California (2023) that confirmed California community colleges had to provide remediation to 80% of students. Remediation costs in America soared to $1.3 billion per year (Center for American Progress, 2023), and 43 million Americans are illiterate (National Center for Education, World Atlas, 2023). Rather than address the problem, colleges and universities are removing writing entrance exams, and the SAT and ACT have made the writing component optional in their tests (Sorenson, 2022).

Artificial intelligence in writing

AI's application in education is not without controversy (Chen & Lin, 2024). Educators in educational technology have concluded that AI can help or hinder and offer affordances or limitations in education. The greatest hindrances in leveraging AI in education include limiting critical thinking skills and marginalizing reasoning, communications, and relationships (Al-Zahrani, 2024). Paradoxically, many of AI's affordances include these same concepts: improved relationships, communications, critical thinking, and reasoning skills (Cinque, 2024). AI in education can save educators valuable time analyzing data and personalizing learning pathways by analyzing and reporting individual students' learning styles and preferences (Tian, 2024). LLMs can evaluate entire lessons and improve pedagogy, content, and overall lessons to increase student achievement (Tian et al., 2024). AI enables educators to input complete lessons and curricula, and then the AI will evaluate and suggest improvements. Educators can even upload full transcripts of classes and have AI assess their effectiveness.

Automated Writing Evaluation

AWE is a potential solution to declining student writing skills (Cardon et al., 2023). AWE is an AI writing evaluation system based on NLP algorithms that analyzes and provides substantive feedback on grammar, syntax, style, and tone (Vang, 2023). Newer AWE programs offer customizable rubrics and robust analytics and reporting (Fagbohun et al., 2024; Gao et al., 2024). AWE is revolutionizing the teaching and learning of the writing process. In some cases, AI puts a wedge between teacher and student, but other researchers argue it can bridge the relationship between students and teachers. Some AWE tools include Grammarly, Turnitin, WisdomK12, Coh-Metrix, Mi-Writer, Google Docs, and Writing Pal (W-Pal) (Marchionda, 2023; Omid, 2022). AWEs are learning human linguistic models at an uncomprehensive pace (Fagbohun et al., 2024).

The studies' results are mixed and even conflicting. Figure 1 shows a convergence of affordances and limitations of integrating AWE in the classroom.

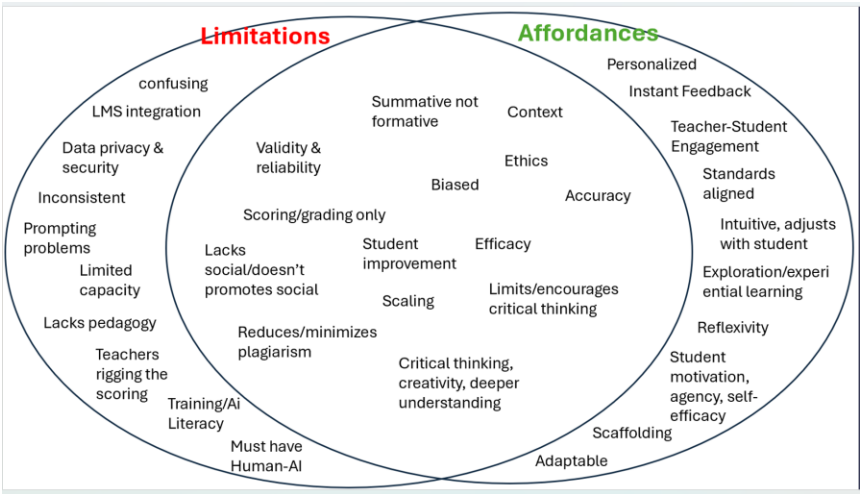

Figure 1: *AWE Limitations and Affordances*
Note. Information adapted from Gao et al. (2024).

The rapid evolution of AWE tools may explain these discrepancies. AWE is evolving at lightning speed by learning exponentially fast when earlier programs struggled to provide substantive, consistent, and accurate feedback on complex texts (Fagbohun et al., 2024). Newer language models using bidirectional transformers are more accurate and adaptable, can evaluate text based on context, not just grammar, and are becoming more efficient at analyzing longer texts.

Automated Writing Evaluation Affordances

AWE programs provide numerous affordances to educators and learners in all educational domains. All studies have noted the rapid speed at which AWE provides feedback (Fagbohun et al., 2024; Gao, 2024; Vang, 2023). One of the reasons educators stray from assigning extended essays is because of the time it takes to grade. AWE reduces the scoring time from hours to seconds. According to Vang's (2023) study, this immediate feedback increases motivation. AWE also promotes critical thinking, creativity, and a deeper understanding of the content (Gao et al., 2024; Fagbohun et al., 2024; Organnisciak, 2023). Organnisciak et al. (2023) was the only quantitative study that found AI can accurately evaluate critical thinking skills. However, this new research has not been replicated and is countered by most other studies.

Omid (2022) also contended that AWE minimizes plagiarism rather than increases it, which conflicts with the extant literature. Omid's research directly conflicts with other research that links AWE to increased plagiarism (Cardon et al., 2023).

Research is also conflicted with AWE's reliability and objectivity. Omid (2022) and al Braiki et al. (2020) asserted that AWE is reliable and objective. Tian et al. (2024) agreed that AWE was more accurate than human evaluation due to bias and low expectations. However, multiple research studies questioned AWE's accuracy and bias (Cardon et al., 2023; Fagbohun et al., 2024; Gao et al., 2024). Further researchers need to address these discrepancies. As these programs quickly evolve, results will change.

Other researchers have shown that AWE promotes reflexivity, exploration, and experiential learning, which can lead to improved writing skills (Dugartsyrenova, 2020). Research also indicates that positive and encouraging

feedback that AWE provides students can improve learning outcomes (Lin et al., 2023). Writing feedback must be substantive and encouraging for students to improve (Giouroukakis et al., 2021). However, limited quantitative research exists on whether AWE improves student writing skills. Fan and Ma's (2022) study found that when using a control group vs intervention group, the group AWE helped students more than the control group that did not use the AWE. Writing performance increased in the group that used the AWE compared to those that did not. Additionally, Fan & Ma's (2022) results contradicted each other because another group's scores were no different from the intervention group on another feedback loop. One feedback loop showed improvement with the group of students using AWE, and the other feedback loop showed no significant difference in scores. No other known studies have focused on pre-post improvements in middle school or high school student writing skills when using AWE systems.

A significant deterrent in providing robust writing assignments is scalability. Large class sizes in higher and secondary education deter teachers from providing quality and quantity writing assignments. AWE counters this with the speed and accuracy of scoring and providing feedback quickly (Fagbohun et al., 2024; Gao et al., 2024). However, Huawei's (2023) study countered Gao et al.'s (2024) argument, stating that AWE is unprepared for scaling to large classrooms.

AWE can improve student-teacher relationships because students see the machine responses as more objective than their teachers' criticisms in their feedback loop (Fagbohun et al., 2024; Tian et al., 2024). Vang's (2023) study demonstrated stronger student-teacher relationships due to increased time in evaluating AI feedback; instant and actionable feedback allowed for conferencing, revisions, critical thinking, independent learning with AI, and actionable improvements before even conferencing with the teacher, and the time teachers save in reading and manually grading provided them more time to engage and conference with the students.

AWE promotes independent and personalized learning (Fagbohun et al., 2024; Gao et al., 2024; Tian et al., 2024). Vang (2023) showed that AWE enabled students to work independently. The feedback provided empowered and encouraged students to revise their drafts independently. Vang's (2023) study showed that diagnostics helped direct writing instruction and convey the writing process to studies. The analytics guided teachers to direct instruction and encouraged specific pedagogical models like modeling to reach students better. The analytics provided enough information so teachers could leverage the correct teaching style to reach all students. Matelsky et al. (2023) agreed that automatic feedback systems provide prompt and customized feedback, increase content knowledge, and provide suggestions for improvement, which counters most other studies that say most LLMs are quick but do not offer customized feedback and do not personalize the feedback and do not offer suggestions for improvement.

Several studies demonstrated improved teacher efficacy (Gao et al., 2024; Vang, 2023). AWE taught educators the writing process and how to provide more substantive and encouraging feedback. This growth promoted teacher efficacy (Fagbohun et al., 2024). Teacher efficacy was significant with teachers with little to no experience in the writing field. Fagbohun et al. (2024) contended that AWE is a professional learning tool for teachers that trains them to grade essays, helps them recognize patterns in student writing, and uncovers common errors and misconceptions.

Automated Writing Evaluation Limitations

Depending on AI and AWE for writing can create a dependence on AI and decrease efficacy (Cardon, 2023). Depending on AI can create a loss of agency, curiosity, discovery, and motivation to learn. Many researchers contend that using AWE and AI in writing decreases critical thinking skills (Cardon et al., 2023), while other studies are mixed (Abduljabar, 2024). Cardon 2023 found that 77% of the instructors surveyed believed AI reduces critical thinking skills, and 75% believed AI minimized creativity in writing and coined the term creativity atrophy. Abduljabar's (2024) study was mixed. Some of Abduljabar's participants agreed that AI inhibited creativity and critical thinking, yet others perceived many benefits of leveraging AI in educational settings. Further research is needed to understand how AWE can enhance or hinder critical thinking and creativity.

Researchers have found AWE to be inconsistent, inaccurate, and producing hallucinations (Bang et al., 2023; de Winter et al., 2023; Fagbohun et al., 2024; Bang et al. (2023) found that ChatGPT was only 64% accurate in 10 different categories of reasoning and is inconsistent in reasoning producing mixed results in writing. Further, research has indicated that AWE cannot provide robust, tailored, and contextualized feedback (Huawei et al., 2023; Palermo & Wilson, 2020; Zhu et al., 2020). These studies contradict many claims that AWE is consistent, accurate, and can provide robust, tailored, and contextualized feedback (al Braiki et al., 2020; Omid, 2022; Tian et al., 2024). Researchers must conduct further studies to address these discrepancies.

AWE and AI in writing are causing significant teacher anxiety (Huawei & Aryadoust, 2023). Cardon et al. (2023) noted that teachers fear redundancy and feel overwhelmed by new technology's rapid development, evolution, and demands. Teachers lack training on how to use AWE and lack AI literacy and AI pedagogy, which would support integrating AWE systems (Cardon et al., 2023; Omid, 2022). These stressors have created a negative attitude and decreased teacher efficacy and motivation (Omid, 2022).

Bias, ethics, data privacy, and security are all concerns that Fagbohun et al.'s (2024) study addressed. Depersonalization is another issue that concerns researchers (Fagbohun et al., 2024; Fischer & Hagel, 2024). Other limitations researchers noted include AWE's inability to comprehend students' cognitive skills (Fischer & Hagel, 2024), its lack of robust and deep contextual feedback and representational thinking (Fischer & Hagel, 2024; Gao et al., 2024; Huawei & Aryadoust, 2023; Zhu et al., 2020), and its limitations to scoring and grading rather than providing robust feedback and specific examples to improve writing and organization (Fischer & Hagel, 2024; Gao et al., 2024). AWE platforms are typically summative rather than formative, according to Winter et al. (2023), who agreed and added that they only offer grammatical and mechanical feedback. Finally, Huawei and Aryadoust (2023) concluded that AWE discourages students because it takes the social aspect out of the writing process.

Summary

The extant literature provides a solid foundation for how teachers use AI in writing (Cardon et al., 2023; Omid, 2022) and provides a variety of AWE tools that are currently on the market (Omid, 2022; Marchionda, 2023). Recent literature has provided an extensive quantitative review of AWE's efficacies, limitations, and deficiencies, but few qualitative studies have provided a deeper and richer understanding of educators' experiences with AWE (Gao et al., 2024). Research has clearly stated the importance of writing to promote critical thinking, creativity, and reasoning (Graham et al., 2018). Over the past forty years, America has experienced a decline in quality writing education, and Common Core State Standards have exacerbated this decline (Vang et al., 2023). Multiple gaps in the research remain. Extant literature has revealed multiple systematic literature reviews (Al Braiki et al., 2020; Fan & Ma, 2022; Gao et al., 2024; Huawei & Aryadoust, 2022; Omid, 2022), but few studies evaluated AWE and analyzed how it works and how teachers responded to using it. Most studies were quantitative, and few offered qualitative perspectives (Tian et al., 2024). After thoroughly evaluating the literature, no known peer-reviewed study has evaluated student feedback on using any AWE tool. Recent research has neglected to describe and evaluate how teachers and students engage with software program architecture (Fischer & Hagel, 2024). Gaps in high school and middle school essay evaluation (Latif & Zhai, 2023) and limited research evaluating domain-specific essay assessment exist (Fagbohun et al., 2024; Fischer & Hagel, 2024). Fagbohun (2024) also highlighted critical gaps in evaluating LLM formative feedback, understanding how AWE supports personalized learning, adapting assessment methods to individual student learning plans, and identifying cognitive patterns to improve personalized interventions. This study aims to qualitatively analyze how teachers and students perceive the latest AWE technology integrated into private and public Northeastern United States middle schools, which will address these gaps.

Research Design and Methodology

This study employed a multiple case study design by leveraging artifacts, interviews, and questionnaires to determine student and teacher perceptions of the AWE program WisdomK12. The aim was to understand how WisdomK12 provided feedback to students and how they interacted with the program to improve writing through continuous feedback loops. Data analysis provided thematic descriptions of how students and teachers responded to the substantive feedback loops WisdomK12 provided during multiple extended essay prompts during the spring semester 2024 (February – May 2024). Data analysis involved providing a detailed description of each case, thematic analysis across each case, and finally, making assertions regarding the cases (Stake, 1995). Triangulation of data from the artifacts, interviews, and questionnaires provided the basis for synthesis and direct interpretations led to developing naturalistic generalizations of the cases (Stake, 1995).

Setting and Participants

This study used two middle schools located in the Northeastern United States. The first was middle school, which was a public school, and the second was a parochial school. Each school's population was mainly white or Caucasian students of middle-class socioeconomic status. Both schools reported increased behavior and attitude problems due to the recent COVID-19 shutdowns, and teachers noted significant differences in student motivation and attitude compared to pre-COVID-19 effects. Purposeful sampling provided four teachers and 47 students. The parochial school provided 27 seventh-grade students, and the public school provided 20 eighth-grade students. The parochial school had one English Language Arts (ELA) teacher participate, and the public school had three ELA teachers participate. Consent and assent were obtained at each location.

Procedures

From October through May 2024, ELA teachers from two Northeastern United States public and private schools assigned their typical writing essays and prompts throughout two semesters. Teachers applied WISDOMK12 and graded manually to compare findings. Both public and private schools applied evidenced- and standards-based writing rubrics. The classes used

Teachers provided writing prompts and feedback based on the semester's assignments, loaded the content into WidsomK12, and gave students a login to submit the assignment through WisdomK12. Teachers evaluated the AWE's feedback before giving the AI-generated feedback to the students to ensure accuracy and understanding. Upon completion, data was collected from the WisdomK12 feedback loops, questionnaires, and individual and semi-structured interviews with all students and teachers participating in the study.

Private School Procedures

The private school teacher used WISDOMK12 in two domains: ELA and technology courses. In October 2023, the teacher first introduced WISDOMK12 to two eighth-grade ELA classrooms in a private school in the Northeastern United States. This eighth-grade class was significantly lower academically than any class the teacher had taught in the previous 48 years. These students were the class most affected by the pandemic and negatively impacted by social media. Students had done little writing in sixth and seventh grades.

Chromebooks were not available when the school year started. Instead of using WISDOMK12 SWIPES so that both the teacher and AI could analyze baseline writing samples, the teacher required the students to write a two-page letter of introduction. The teacher noted trends among the essays and presented about six weeks of writing instruction, often using "short writes" to help students feel successful.

The first complete assignment in WISDOMK12 was a narrative essay with a 100-pt. The rubric was modeled after the PA State Writing Rubric, cross-referenced with the NYSED Writing Rubrics. Pre-writing on paper was required for a minimum of ten minutes. The teacher circulated the room and helped the students process the personalized AI advice. After two drafts, students could copy and paste their revised essays into a Google doc, apply more "FINAL WISDOM" from the AI feedback, use the grammar and spell check, and submit for a final grade. The teacher scored the final submissions by hand but compared the WISDOMK12 final draft scores to affirm the tool's efficacy.

The second complete assignment in WISDOMK12 for this class was a choice among three persuasive essays. Topics include school cell phone usage, physical education requirements, and community laws. The teacher applied SWIPES to the assignments for students who had finished their final essays and changed the rubric in WISDOMK12 to align with the assignment.

The third assignment for which WISDOMK12 drafts were required was another narrative, "A Change of Heart." In April, the teacher used a previously released NYSED reading prompt with the RACE rubric to practice answering test questions. Several schedule changes and Chromebook conflicts prevented the students from completing the assignment before testing.

The other students who applied to WISDOMK12 were sixth—and seventh-grade students in technology classes. Using WISDOMK12 in the technology class aimed to integrate writing into a STEM subject. The emphasis was on describing technology and informative writing rather than teaching the writing process. The teacher did not use WISDOMK12 scores as part of their grade. The objective was to increase cross-disciplinary writing.

Public School Procedures

Integrating the WisdomK12 platform into seventh-grade social studies classes followed a detailed and deliberate process designed to enhance student engagement with writing assignments while incorporating technology into instruction and assessment. The process began by reviewing the curriculum and identifying reading assignments aligned with specific content areas. Teachers then crafted questions with clear answers that allowed for further elaboration, encouraging students to develop their responses fully. Students began by outlining their essays using a graphic organizer before drafting their work directly into the WisdomK12 platform. The platform provided feedback designed to help students reflect on their writing, make necessary revisions, and deepen their understanding of the material.

WISDOMK12 provided teachers with comprehensive training focused on the tool's functionality for successful implementation. This training emphasized creating assignments, using the RACE rubric (Restate, Answer, Cite,

Explain), and integrating the tool into grading. To ensure consistency between the teachers' evaluations and the platform's feedback, teachers compared their scores using the RACE rubric to those generated by the WisdomK12 AI. This comparison was conducted to assess inter-rater reliability and ensure that both human and AI evaluations were aligned.

The writing assignments themselves were based on the RACE rubric. The district established a structured approach based on evidence-based writing best practices. The teachers required students to complete these tasks three times over nine weeks. In October 2023, teachers began integrating these assignments into WisdomK12. Students submitted their work directly through WisdomK12, which applied the RACE rubric to assess their writing and provided more detailed feedback, including style and substance suggestions for revision. WISDOMK12 included suggestions on grammar, coherence, structure, and style, offering students valuable insights to improve the students' writing. The platform's feedback system also gave teachers a clearer view of student performance, allowing for more informed instruction.

During the initial implementation phase from October to December 2023, teachers used both manual grading with the RACE rubric and the AI-generated scores from WisdomK12. This process allowed for ongoing assessment of inter-rater reliability and ensured alignment between human and AI evaluations. From January onward, teachers exclusively used WisdomK12 for grading, continuing to rely on the RACE rubric for core assessments. In one approach, teachers used the feedback generated by WisdomK12 to guide students in improving future assignments. Another approach encouraged students to engage directly with feedback to revise their current work, fostering improvement through reflection and revision.

Teachers also conducted one-on-one conferences with students to discuss the detailed feedback provided by WisdomK12. These conferences were instrumental in guiding students either in revising their current assignments or preparing for future writing tasks. By focusing on targeted feedback, the conferences reinforced student learning and promoted continuous improvement in writing.

Data Analysis

The researcher analyzed the individual interviews by transcribing, coding, conducting a thematic analysis, and then interpreting the findings according to Stake's (1995) best practices. Similarly, the researcher collected and organized the continuous feedback loop data, identified patterns, conducted a contextual analysis, and iteratively reviewed the data. Finally, the researcher cleaned the data from the questionnaires, conducted a descriptive quantitative and qualitative analysis, and compared findings across each case. Leveraging a robust qualitative data analysis software program, Atlas.ti, the researcher triangulated the data by cross-referencing, evaluating frequencies, synthesizing shared insights, and finally drawing conclusions from the combined data sets based on Elmore's (1993) ICF and RQs.

Ethical Considerations

The researcher has no financial conflicts of interest, professional affiliations, or ethical complications that could compromise this research's integrity, objectivity, or validity. All study aspects were conducted independently, adhering to ethical guidelines and standards. The researcher is Collaborative Institutional Training Initiative (CITI) certified and adhered to all human ethics requirements and regulations, including respect for humans through informed consent and assent, beneficence by minimizing harm and maximizing benefits to participants, and justice by ensuring fair and equitable research practices.

FINDINGS

Participants included 27 students in the seventh grade at a private school in Northeastern United States and 20 eighth-grade students at a public school in Northeastern United States. Results were shared with all eighth-grade teachers in the public school as they prepared to implement the WISDOMK12 tool with fidelity during the 2024-25 school year. In a follow-up survey, the public school provided 18 teacher participants, and the private school had one teacher participate. The students in both schools were predominantly Caucasian from middle-class families. Most public school teachers were white females ranging from three years of teaching experience to more than 30 years of experience. The private school teacher participant had more than 40 years of experience. The students all have been experiencing extreme behavior issues and challenges in learning due to COVID-19's social and emotional impact. The private school teacher explained, "This was the most difficult group of students... Completely different creatures from my other 48 years. It (this year) was a real struggle," another teacher from the public school added. "They just bonded over being bad. And when you punish them, they wear it like a badge of honor."

Most students and teachers (n=47) were satisfied with using WisdomK12 (see Figure 2).

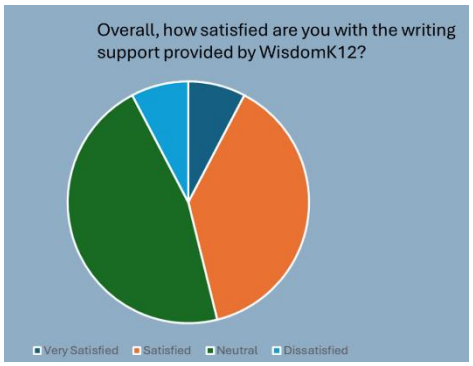

Figure 2: O*verall WisdomK12 Satisfaction*

Every participant surveyed noted improved general feedback. Most who expressed satisfaction noted improved clarity, creativity, grammar, punctuation, and general feedback over feedback teachers provided manually. Students were impressed with the instant feedback, accuracy, and ease of interpretation and application. Teachers stressed how the students valued the computer feedback over their feedback, owing to this phenomenon of student perceptions of teacher bias. All participants, except for the two outliers, believed the program provided objective, timely, accurate, and encouraging feedback. However, even the outliers who expressed dissatisfaction with the program noted on the survey that the feedback WisdomK12 provided was improved over manual feedback provided by teachers. Table 1 provides an overview of the themes generated from this study.

Table 1: *Themes & Subthemes*

Theme	Subthemes	
Personalized learning	Intuitive/Grows with student	Skills growth
Instant Feedback	Accurate	Encouraging
Relationships	Objective	Time

Personalized Learning

All teachers and students concurred that WisdomK12 tailored the feedback to suit the students' grades, literacy, and writing objectives. Bobby, from the parochial school, stated, "I love how personalized and specific it (the feedback) is." Teacher 1 from the parochial school noted that WisdomK12's feedback grew with the student's skills. "WisdomK12 adapted the language to reflect the students' skills and language abilities." Libby was surprised that WisdomK12 listened to her, stating, "I like that it actually reads my essays and pulls actual sentences out from my writing and makes them better and gives them more detail." The sentiment was that the program was listening to her and heard her voice.

Teachers were also encouraged to see how WisdomK12 provided an alternative way to reach students more personalized and directly. Several teachers noted that technology has changed the way students think and learn, even citing Johns Hopkins studies on student brain scans that indicate students are learning differently than before cell phones and personal devices were introduced. One teacher noted, "So my point is we've discovered how to reach them. Perhaps Wisdom K12 is onto something because I think some of the data showed that the kids are responding more to the AI than they are to the human."

Teachers noted how the AWE program provided personalized feedback for every type of writing assignment from persuasive to narrative. The feedback was encouraging and provided examples for improvement. The following demonstrated encouragement in the feedback regarding a narrative a student submitted in an essay on his experience with basketball, "Your enthusiasm for basketball shines brightly through your essay, making it both heartwarming and inspiring." WisdomK12 also provided examples to help students improve their writing while encouraging and motivating them to improve their writing, "You've done a great job of capturing the emotions of various moments but delve deeper. For example, when you mentioned having a joyful attitude, describe the intensity and the environment." Another essential part of the writing process that WisdomK12 addressed was reflection. Each assessment allowed the student to reflect on the writing process. WisdomK12 asked one student, upon completion, "How did your perspectives change after writing this essay?" The teachers agreed that this

encouragement, examples, and reflection pieces of the assessment opened doors to communication and deeper thinking and revising, which the teachers did not believe they could effectively and efficiently do manually.

Teachers noted that WisdomK12 was intuitive and progressed at the students' pace, thus supporting personalized learning and providing encouraging feedback. Overall, these attributes enhanced the writing process. One teacher noted that teachers no longer adhere to the writing process in her observations. This teacher noted that most English teachers never write beyond whatever they did in college or grad school, "They never wrote a thing, and they're teaching writing." Another teacher expanded, "Many skip pre-writing, which to me, I learned late in life, is the most valuable part. Just get your ideas down in some kind of web or organized form or number them and so many teachers don't even touch that." Other teachers agreed, noting that teachers skip doing revisions and neglect resubmitting the papers. Multiple teachers only submitted drafts and did not go through the revision process at all. One teacher explained, "But most teachers aren't gonna do that because they don't have the time…" Another teacher added that peer review was ineffective: "It's the blind leading the blind." The teacher added that WisdomK12 improved these inefficiencies and deficiencies, stating, "This tool solves so many of the challenges, not just the time it saves from taking those first drafts home… You can actually do the entire writing process with this tool."

Teachers believed implementing WisdomK12 improved students' writing skills. Figure 3 shows gains in student achievement after using WisdomK12 supporting the teachers' observations.

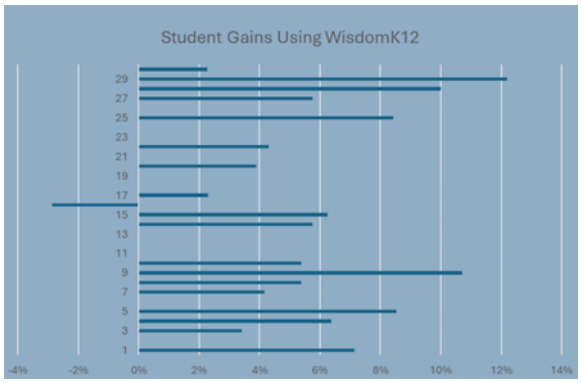

Figure 3: *Student Perceived Gains*

Instant feedback

Students and teachers from both schools concurred that the most significant benefit of WisdomK12 was receiving feedback instantaneously. Figure 4 compares the time teachers reported it would take them to grade the assignments if they had graded manually to when it took WisdomK12 to grade.

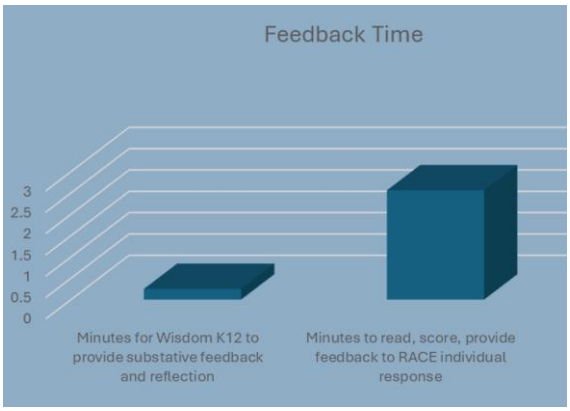

Figure 4: *Feedback Time*

Grading and providing feedback are two different tasks. "Providing substantive feedback takes substantially longer than simply grading a paper," stated one teacher. This table may not be representative of grading and scoring versus providing substantive, encouraging feedback that students can use to revise their drafts. Further research is needed to distinguish scoring from feedback. The students and teachers agreed that the feedback was accurate, unbiased, encouraging, and helpful. Abbie, an eighth-grade student, elaborated, "I can get my feedback in under a minute."

Tiffany agreed, adding, “It makes my writing more engaging for the reader rather than boring and bland.” Hannah concurred, “WisdomK12 has helped me become a better writer, and it helps me make fewer mistakes and add more details.” Teachers agreed that the feedback saved them time grading papers and enabled students to receive feedback for immediate revisions. According to the parochial teacher, when students have to wait an average of two weeks, they have already moved on and forgotten what they had written. The teacher explained, “When the student receives the feedback instantaneously, they can immediately apply it. It is fresh.” Most students and teachers concurred that the program improved clarity and coherence and increased their ability to incorporate feedback effectively. The private school teacher explained that the students were first copying and pasting content from the draft to the final paper, but as they worked more with WisdomK12 and saw what it could do, their motivation changed. The private school teacher elaborated, “As time went on, they became more appreciative of it, and at the end, they had something to do for their religion teacher, a moral autobiography, and they were begging me to put it into Wisdom so that they could get the feedback at home.”

Relationships

A critical aspect of the findings included the relationships WisdomK12 fostered between students and teachers. Students accepted the feedback from WisdomK12 without question or attitude. When receiving feedback from their teachers, the private school teacher stated, Children feel like they are being picked on or attacked.” Another teacher noted, “When they received the feedback from WisdomK12, they accepted it as objective and non-threatening.” This objectivity fostered and nurtured more positive relationships between the students and teachers. The time they have also empowered teachers to delve deeper into creativity, critical thinking, and multiple revisions and iterations to improve the writing because the program was doing tedious work. This allowed more time to conference with the students and build those critical relationships.

Comparison between cases

Results varied between the private and public schools. Both schools’ participants agreed that WisdomK12 provided instantaneous and helpful feedback, but some findings diverged. On average, the private school’s perceived confidence in writing was more significant than the public school’s. See Figure 5.

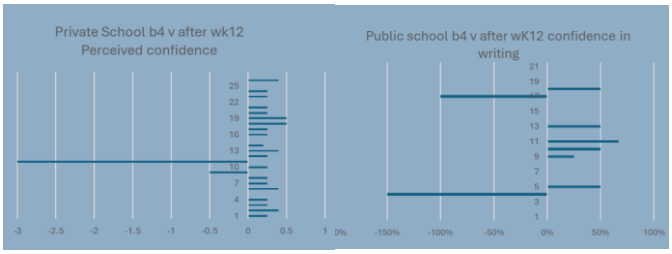

Figure 5: *Confidence Comparison Between Public and Private Schools*

The private school also indicated that significantly more students found it easier to understand and apply WisdomK12 feedback. See Figure 6.

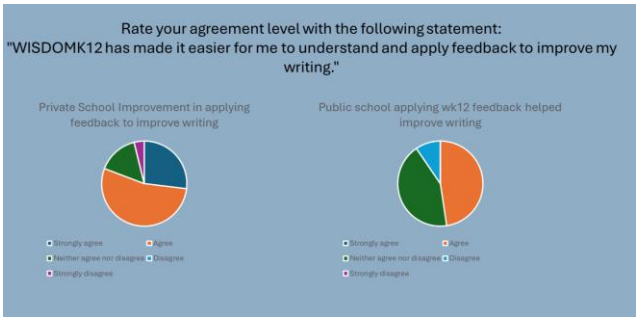

Figure 6: *WisdomK12’s Feedback Clarity*

The quality of feedback, according to the participants of both schools, was comparable. See Figure 7.

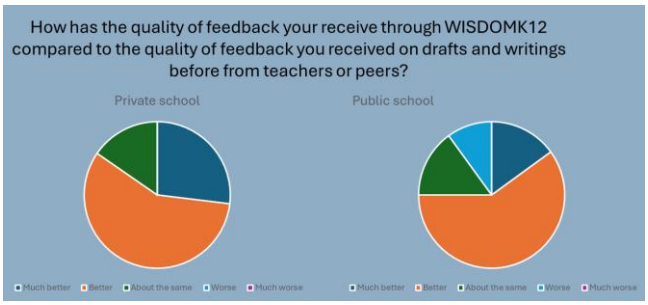

Figure 7: *Perceived Quality of Feedback*

Finally, the private school participants felt more strongly that WisdomK12 improved their editing skills. See Figure 8.

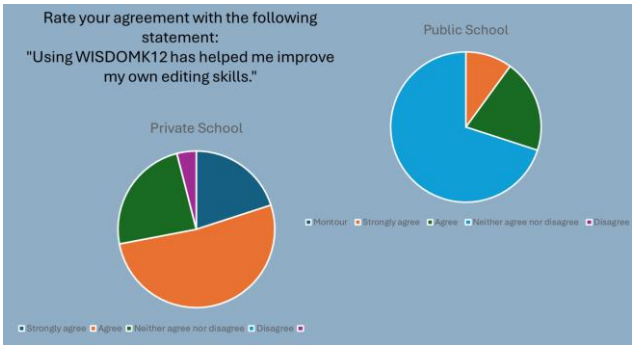

Figure 8. *Students' Perceived Improvement in Writing Skills*

Outlier Data and Findings

Two outliers existed in the findings. Two parochial and public school students gave poor ratings on the questions asked regarding WisdomK12's efficacy, user experience, and perceived skills development. Teachers explained that behavior has been an issue since COVID-19, and attitudes have been poor. The teachers believed these students disengaged and were defiant in using the program, which reflected how they behaved in all other classes. Further research is needed to explain these outliers.

Discussion

This study aimed to determine how middle school teachers and students in the Northeastern United States describe their experiences using WisdomK12. The study supported and extended Elmore's (1993) ICF theory, confirming and refuting the extant literature. Only two participants found WisdomK12 intuitive, helpful, speedy, accurate, straightforward, and encouraging. This section will discuss the findings related to the extant literature and the theoretical framework. Implications and future research will also be discussed.

Summary of Thematic Findings

Theoretically, this study demonstrated and extended Elmore's ICF (1993). WisdomK12 enhanced the teacher-student relationship and content knowledge. After triangulation, surveys, archival data, and interviews concurred that WisdomK12 increased teacher knowledge and skills in the writing process. The AWE program helped improve student-teacher relationships by providing more time and objective feedback. WisdomK12 also improved students' attitudes and motivation by personalizing the feedback and creating a bias-free environment, promoting independent learning and positivity.

The extant literature on AWE is mixed. This study affirmed AWE's affordances and negated the limitations in the extant literature. This study affirmed that AWE provides instant feedback, thus streamlining the writing process and improving revisions. Teacher-student engagement and relationships improved. Teachers found the program reliable, reflexive, and promotes student-centered learning. The teachers also believed WisdomK12 was accurate and authentic and promoted critical thinking and creativity. The students found WisdomK12 to be objective, fast, and transparent. Both students and teachers found the program overall to be satisfactory.

WisdomK12 promoted personalized learning by providing tailored feedback and specific suggestions (Fagbohun et al., 2024; Tian et al., 2024). The program tailored feedback and suggestions to learners' styles, characteristics, demographics, and preferences, thus promoting student-centered learning. Instant feedback and student-centered

learning increased engagement, participation, communication, and collaboration (Omid, 2022; Vang et al., 2023). This led to closer, more meaningful, and trusting relationships between students and teachers. The students used and applied WisdomK12's feedback more readily than they would have applied their teacher's feedback. Further, the relationships improved because the students perceived the AWE as objective and non-threatening. The AWE's objectivity encouraged and motivated the students (Lin et al., 2023; Tian et al., 2024).

This AWE program significantly improved the writing process by providing teachers and students with comprehensive, meaningful, and encouraging feedback and specific examples of how to improve their essays (Fagbohun et al., 2024; Fan & Ma, 2022; Vang et al., 2023). This feedback improved teachers' pedagogical practices and may have contributed to student gains in writing scores (Fan & Ma, 2022).

This study demonstrated that WisdomK12 fostered creativity, originality, and critical thinking by providing contextualized, consistent, and insightful feedback (Cardon et al., 2023; Fagbohun et al., 2024; Matelsky et al., 2023). Jiang et al. (2023), Cardon et al. (2023), and Palermo and Wilson (2020) research questioned AWEs' ability to provide examples and meaningful and contextualized feedback. This study refuted these findings and demonstrated that WisdomK12 provided appropriate, humanized, clear, concise feedback and specific examples. Teachers confirmed that the program fostered creativity and originality and promoted critical thinking (Fan & Ma, 2022; Organnisciak et al., 2024)

Multiple studies have criticized AWEs' stating that the programs limit critical thinking, authenticity, and creativity (Cardon et al., 2023; Gao et al., 2024). Many studies have also professed AWE's limitations in providing contextualized, conceptual, and representational thinking feedback (Cardon et al., 2023; Fisher et al., 2024; Gao et al., 2024). Fisher et al. (2024) proclaimed that teacher manual feedback was still superior to AWE, while other studies recommended cooperation between AI and humans (Cardon et al., 2023; Huawei et al., 2023; Tian et al., 2024). This study presented evidence from teachers and students that AWE-generated feedback was superior and preferred to human feedback. However, further research must be conducted to support and generalize these findings. This study, however, clearly demonstrated that WisdomK12's feedback was contextual, robust, student-centered, and intuitive. The study negated de Winter et al.'s (2023) contention that AWE's rubrics were inaccurate and ineffective with WisdomK12's robust and adjustable rubrics that can be tailored to each writing assignment and are standards-aligned.

According to de Winter et al. (2023), AWEs' feedback was inconsistent, confusing, and time-consuming, creating more work for the teacher. This study demonstrated the opposite, with most students and teachers confirming that WisdomK12's feedback was clear and easy to understand, interpret, and apply. Zhu et al.'s (2020) study showed no significant gains in students' writing skills, yet this study showed modest gains. Further research is needed to generalize and confirm these initial results.

Omid (2022) noted teachers' reluctance and negative attitudes toward using AWE. However, this study showed that teachers who learned about other teachers using the program asked for their assignments to be run through WisdomK12 throughout the year. This study showed that WisdomK12 increased teacher motivation to use AWE.

Limitations and Delimitations

This study's limitations and delimitations should guide future research. The nature of this study did not allow for generalization and was limited to one specific region and age group of the United States. Each school had slightly different procedures and integrated WisdomK12 differently, so the comparison between the public and private schools is questionable. Too many variables exist to come to a solid conclusion on the differences and similarities between public and private schools. Further, only one teacher in the private school participated, while 27 teachers in the public school participated, thus providing unreliable results.

Recommendations for Future Research

Future research must account for the abovementioned limitations by consistently applying the intervention with consistent procedures for each location. Future research should also quantitatively address the accuracy of WisdomK12. Future research should address whether an effective AWE program motivates teachers to assign more extended essays throughout the year and if AWE quantitatively increases students' writing skills. Future research should also evaluate the consistency and reliability of the feedback. Finally, research should address AI literacy and how teachers incorporate AWE into assignments across multiple disciplines.

Conclusion

Teachers and school districts have progressively deemphasized writing in the curriculum. Student creativity, critical thinking, and deep content learning have suffered because of this pedagogical shift. AWE could provide a solution to empower teachers to assign more extended essays and promote writing in the classroom again, thus improving creative thinking and creativity. This study demonstrated that a new, cutting-edge AWE program is ticking all the boxes of providing quality writing feedback and refuting past studies criticizing AWE feedback. Further research is needed to extend this study. However, the initial findings are promising and suggest that this latest AWE can provide robust, contextualized, personalized feedback, save teachers time, foster positive student-teacher relationships, minimize bias, and provide specific and tailored examples to improve student writing in middle school.

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Exploring How Physical Artifacts Motivate Teacher Leaders: A Hermeneutic Phenomenology about the Lived Experiences of Teacher Leaders

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ABSTRACT
This hermeneutic phenomenology addressed the problem of falling teacher retention rates of K-12 teachers due to teacher burnout by exploring the lived experiences of teacher leaders and how they are motivated by physical artifacts. The theory framing this study is thing theory. Thing theory framed the study by exploring life experience and the relationship between teacher leaders and their things. The study offered additional information on the use of physical artifacts in qualitative research and the object discussion. This hermeneutic phenomenology used a triangulation of data collection including the semi-structured interview, object discussion, and in-person interviews. The research study setting was a K-12 charter school incorporated in rural Southeastern United States. The study included 16 teacher leaders from grades 2-12. Eligible candidates earned a qualifying score between 124 and 155 on the pre-screening survey, a valid and reliable tool adapted from two specific teacher leadership instruments. Findings suggest that teacher leadership creates positive experiences for teacher leadership and that physical artifacts motivate teacher leaders by creating a relational bridge and affirming professional choice.
Keywords: teacher leadership, thing theory, physical artifact, object discussion, self-efficacy, collective efficacy, teacher identity

INTRODUCTION

Historically, teacher leadership served as a means of improving school reform. The implementation of teacher leadership aimed to improve school reform efforts by democratically sharing authority through leadership frameworks such as distributed leadership (Spillane, 2005), in which leadership is shared between school administration and teacher leaders (Smylie et al., 2002; York-Barr & Duke, 2004). Moreover, adding leadership to the role of teacher was meant to professionalize and empower teachers and offer a solution to teacher attrition (Hallinger et al., 2020). To date, teacher leadership has existed for well over a century, yet teacher turnover and attrition are at an all-time high, with some research reporting that half of all new teachers leave the field within the first five years (Lovett, 2023; Madigan & Kim, 202).

Socially, increasingly more educational research reports fewer teachers remaining in the field for many reasons, including but not limited to environmental factors such as school climate and culture and, to a greater degree, psychosocial factors such as being overworked, experiencing burnout, and feeling stress (Madigan & Kim, 2021; Nguyen et al., 2020; Schott et al., 2020). Teacher leadership remains a relevant and practical means of school reform, if only for the teacher leaders themselves. Teacher leaders experience positive leadership outcomes such as diverse collaborative leadership, empowered professional growth, transformative learning connections, and leadership and validation (Crum, 2024). Primarily, teacher leaders show high degrees of influence in the classroom, on peers, and in the school (Yalçın & Çoban, 2023). The influence expressed by teacher leaders takes many forms, such as pedagogical excellence (Harris & Jones, 2019) and overall school improvement (Shen et al., 2020) through professional development and mentorship (Nerlino, 2020). The role of the teacher leader and partnership with school administration, through shared authority, empowers the teacher leader to support increased self-agency and self-efficacy within the teacher leader (Nguyen et al.se, 2020). Nevertheless, the problem of teacher attrition continues to grow.

Theoretically, the field of teacher leadership lacks robust empirical evidence extending the research base of teacher leadership (McGinity et al., 2022; Pan et al., 2023). Therefore, this study aimed to make a significant theoretical contribution by applying the thing theory (Brown, 2001). The study explored the lived experiences of teacher leaders and how physical artifacts, or things, motivate them. Things collected and kept by teacher leaders often induce nostalgia, promoting the authentic self and action-forward motivation (Sedikides & Wildschut, 2023). Thing theory expresses the idea of objects transcending to the place of things through a relationship with the human, particularly the subject-object relationship, and is rooted in Heidegger's thing-centered worldview of "das ding" (Brown, 2001; Zhao, 2023). Things inhabit and animate; things deliver artistic and philosophical findings, bringing with them their presence, force, and meaning to society (Brown, 2001). Dipert (1995) reported the

hesitancy of literature in defining artifacts. Hence, physical artifacts in this study are things collected and kept by teachers because they hold significance. Objects that become things have lives of their own and are no longer being used in their practical or usual way but in a new way that is representative of the "uncanniness" and nostalgia of the fantasy of life (Robertson, 2020).

Problem and Purpose of the Study

The research study addressed the problem of the falling teacher retention rates of K-12 teachers due to teacher burnout (Lovett, 2023; Pineda-Báez et al., 2020; Shen et al., 2020). Teacher leadership, a widely implemented solution to school reform efforts, holds the potential for increased teacher motivation and retention (Gordon et al., 2021; Y. Liu et al., 2021). Extant literature reported teacher leaders as experiencing increased self-efficacy and motivation due to increased possibility and avenues of influence on peers and students (Nerlino, 2020; Schott et al., 2020), yet attrition looms as an insurmountable challenge to teacher leadership due to burnout caused by high degrees of responsibility on the part of the teacher leaders (Arthur & Bradley, 2023; Ingersoll, 2023; Madigan & Kim, 2021).

This hermeneutic phenomenological study explored how physical artifacts motivate teacher leaders at a K-12 charter school system in the rural Southeastern United States. The seminal work of York-Barr and Duke (2004) defined teacher leadership as the individual or collective manner by which teachers influence peers, principals, students, and stakeholders to improve instructional practices to increase student achievement. The theory framing this study is thing theory (Brown, 2001). This hermeneutic phenomenology exploring how physical artifacts motivate teacher leaders was necessary to extend the current body of teacher leadership literature and provide workable solutions to teacher attrition through the practical avenue of motivation represented by physical artifacts.

The Significance of the Study

The research study drew theoretical significance from the thing theory (Brown, 2001). Thing theory aligned with the focus of hermeneutic phenomenology through Heidegger's phenomenological traditions of joining phenomenology and the philosophy of appearances (Rømer, 2011). Thing theory framed the study by exploring life experience and the relationship between teacher leaders and their things. The lens of thing theory allowed the researcher to examine the importance of things collected, kept, treasured, and used by teacher leaders for optimism, motivation, authenticity, and the pursuit of goals (Sedikides & Wildschut, 2023). Moreover, the framework of thing theory allowed the examination of things belonging to teacher leaders and what they say about teacher leaders concomitant with nostalgia and its affair with one's imagined life (Robertson, 2020). Many researchers report extant teacher leadership research to be unconcerned with theory (Ford et al., 2020; McGinity et al., 2022). Thus, the application of theory to the field of teacher leadership research is vitally significant in extending the knowledge base. Although thing theory primarily applies to human sciences such as psychology and anthropology, it was relevant to this study to examine the relationship between teachers and the things they keep (Roberston, 2020).

The empirical significance of the research study was to fill a gap in the current research by exploring how teacher leaders are motivated (Gordon et al., 2021; Y. Liu et al., 2021) by physical artifacts. Teacher burnout and attrition pose ongoing challenges to educational leaders, so understanding what induces the motivation causing teachers to stay in the classroom is an under-developed area of research integral to teacher retention (Arthur & Bradley, 2023). Intrinsic motivation is an innate factor driving teacher performance currently augmented through professional learning opportunities meant to improve teacher quality through teacher accountability (Guenther, 2021). The persistent and growing problem of teacher attrition demands answers to gaps in the literature about teacher identity development (Hong et al., 2024). Teacher identity is a complex construct revealing what teachers do and how and why they do it (Schutz et al., 2020). Understanding how physical artifacts motivate teacher leaders offers a unique view of teacher identity that is often unexplored and an avenue into apprehending what causes teachers to stay in the classroom. The physical artifacts collected and kept by teacher leaders show relevant messages about the lived experiences of teacher leaders supporting the extension of the field (Mozeley et al., 2023). The field of teacher leadership research is rife with myriads of definitions and unclear avenues of teacher leadership influence, so further research into the lived experiences of teacher leaders offers the possibility of consolidating the term and potential for best implementation (Nguyen et al., 2020). Other empirical significance regards using physical artifacts in qualitative methodologies and the material potency of things teachers keep (Harrison et al., 2024; Mozely et al., 2023).

The research study was significant because it explored how physical artifacts motivate teacher leaders, revealing the potency of physical artifacts (Woodward, 2020) in the lives of teacher leaders. The research study aimed to maximize teacher leadership as a school reform effort, offering a potential solution to teacher burnout by using physical artifacts to motivate and provide professional learning for teacher leaders. The research study revealed how the physical artifact functions as a relational bridge, revealing experiences with well-being (Mozely et al.,

2023; Thorpe et al., 2024). Thus, the research study targeted why teacher leaders stay in the classroom by finding physical artifacts to validate and confirm through storytelling (Woodward, 2020).

Central Research Question
How do physical artifacts motivate teacher leaders?

LITERATURE REVIEW

Teacher Leadership

Extant literature shares a variety of definitions related to teacher leadership inhibiting the extension of knowledge (Berg & Zoellick, 2019; Nerlino, 2020). The variety of definitions includes the differing positions, dimensions, and roles of teacher leadership, incurring ambiguity and impeding the potency of teacher leadership as a means of school reform effort (York-Barr & Duke, 2004; Nguyen et al., 2020; Wenner & Campbell, 2017). The seminal work of York-Barr and Duke (2004) called attention to the role of teacher leader due to the complexities related to the position. Similarly, Wenner and Campbell (2017) shared concerns about the position of the teacher leader, dubbing it an 'umbrella' term that integrates infinite possibilities of functions. Within the field, definitions mistakenly promote normative teacher actions and behaviors like the assumption of authority, decision-making, and collaboration as leadership (Gümüş et al., 2022; Sawalhi & Chaaban, 2022; Wenner & Campbell, 2017). The ambiguity of the term exhausts research, slowing advancement with redundant and competing definitions and dimensions varying from the idea of leadership residing in the classroom next door and every teacher sharing ideas and being a leader (Gordon et al., 2021) to exhibiting leadership outside the classroom and school (Wenner & Campbell, 2017). Other seminal works report teacher leadership centered on the teacher leader's influence, position, and performance (Katzenmeyer & Moller, 2001; Lieberman, 1988) such as needing proof of teacher leadership measured by the improvement of colleagues (Reid et al., 2022).

The variety of definitions and dimensions of teacher leadership reveal disagreement on the core theoretical meaning of the term diminishing rather than improving the legitimacy of teacher leadership (Bellibaş et al., 2021; Nguyen et al., 2020; T. Wang et al., 2022). Recent research in the field of teacher leadership recognizes the need for a combined and operational definition, maximizing the potential of teacher leadership by offering unique variations of the term. Supovitz and Comstock (2023) targeted distributed leadership as a positive antecedent to teacher leadership. Distributed leadership, the most popular means of teacher leadership (Hallinger & Kovačević, 2022) elevates the role of the teacher leader from the classroom to the school and organization, thereby empowering teacher leaders (Gordon et al., 2021; Pineda-Báez et al., 2020). Oppi et al. (2023) delineated between the formal and informal and individual and collective aspects of teacher leadership, while Nerlino (2020) proposed four relevant dimensions of teacher leadership with a specific and compensated role for the teacher leader, extending the work of Berg and Zoellick (2019). Notably, out of 150 empirical articles, Nguyen et al., (2020) reported 17 different definitions along with the inadequacy of reports, 11 stating their definition of teacher leadership, and only six articles sharing their chosen definition from the extant literature. Therefore, the definition guiding this work is that of York-Barr & Duke (2004), stating that teacher leadership is how teachers influence all educational stakeholders, improving pedagogical practices to improve student achievement. Regardless of the manner, extant research agrees that teacher leadership unites the school community and promotes success for all stakeholders (Friesen & Brown, 2022).

Teacher Burnout and Attrition

The practice of teacher leadership produces overwhelmingly positive results, as reported in the literature (Schott et al., 2020), including both job satisfaction and student achievement as related outcomes (Fernández Espinosa & López González, 2023); however, a duality of teacher leadership exists whereby the nexus of burnout leading to attrition resides (Nerlino, 2020). Teacher attrition is a global problem, with the need for the global recruitment of 69 million teachers by 2030 (Madigan & Kim, 2021) to provide quality education. Teacher attrition is a common, longstanding problem in the United States (Han, 2023). Moreover, extant literature reports attrition in the ranks of new teachers, causing the loss of at least half of all new teachers within five years (Perryman & Calvert, 2020). Burnout, a state of exhaustion caused by demanding work conditions, cannot be reported as a direct cause of teacher attrition, but it is a contributing factor (Marcionetti & Castelli, 2023). The role of teacher leader offers a practical solution to burnout and attrition due to increased self-efficacy and feelings of empowerment, yet, coincidentally, the higher workload and greater responsibility of the role pose threats to job satisfaction (Nerlino, 2020). Often, when teachers transition from classroom teacher to teacher leader, the change generates resistance and opposition, resulting in isolation from peers due to the egalitarian nature of teaching (Nerlino, 2020; Sawalhi & Chaaban, 2022). Experiences such as these induce guilt and shame for the teacher leader, competing with the positive outcomes of teacher leadership (Schott et al., 2020). Nonetheless, extant literature reports teacher leadership, due to greater self-agency gained from leadership experience (Yoon & Goddard, 2023), as a means of increasing self-efficacy for the teacher leader and improving job satisfaction. These positive outcomes might draw

stronger candidates to the field and support teacher retention (Akman, 2021; Conan Simpson, 2021). This research study explored ways to increase teacher job satisfaction, offering a potential solution to teacher burnout, attrition, and gaps in the literature related to teacher identity (Hong et al., 2024) by answering how physical artifacts motivate teacher leaders.

Self-Efficacy and Collective Efficacy

Self-efficacy and collective efficacy are critical factors related to teacher motivation and degree of job satisfaction. Self-efficacy is an individual's belief about their ability to produce change and reach desired goals (Bandura, 1977a; Khan et al., 2024). Specifically, when teachers experience self-efficacy related to student engagement, learning, and achievement outcomes, it is known as teacher self-efficacy (Shafiee & Ghani, 2022). Self-efficacy is an essential factor in teacher leader because, when facing burnout and low job satisfaction, efficacious teachers exhibit greater degrees of resilience and self-esteem and are more active in leadership (Bellibaş et al., 2021; Kılınç et al., 2021) subsequently leading to higher morale and additional positive outcomes (Fernández Espinosa & López González, 2023; King & Holland, 2022; Yoon & Goddard, 2023). Efficacious teachers experience less conflict and closer relationships with students and exhibit persistence when facing challenging situations, positively affecting their teaching practices and overall commitment to the field (Marcionetti & Castelli, 2023; Yin et al., 2022). Collective efficacy includes the beliefs of the faculty, grade level, or department members related to their capability to create positive change and reach set goals (Bandura, 2000). Extant literature reports improved teacher morale and successful schools resulting from collective efficacy, while higher degrees of self-efficacy produce successful teachers, potentially leading to improved teacher retention (De Jong et al., 2022; Hosseingholizadeh et al., 2023; Y. Liu et al., 2022; Qadach et al., 2020).

Physical Artifacts in Qualitative Research

For this research study, artifacts are any objects humans make to which symbolic, emotional, and affective meanings are connected (Saldaña & Omasta, 2021). The physical artifacts collected by teacher leaders reveal their attitudes, beliefs, and values. Physical artifacts have stories, and through this research study, the researcher looked to infer the meanings of the artifacts that teacher leaders keep. The researcher applied four analytic frames for incorporating physical artifacts into qualitative research, including analysis of how the artifact is an extension of the owner, how the artifact belongs in its space, the symbolism of the artifact, and the process related to the thing (Saldaña & Omasta, 2021). The research study included object interviews during which the participants shared an artifact standing for their teacher leadership (Thorpe et al., 2024). The object interview prioritizes human experience and intelligence with objects instead of relying upon dialogue alone (Holmes, 2020).

The Study

The research study engaged a hermeneutic phenomenological research design with inductive data analysis and criterion sampling. The research study setting was a K-12 charter school incorporated in rural Southeastern United States. The study included 16 teacher leaders from grades 2-12. Eligible candidates earned a qualifying score between 124 and 155 on the pre-screening survey, a valid and reliable tool adapted from two specific teacher leadership instruments created by Katzenmeyer and Moller (2009) and J. Chen (2022). After acquiring IRB approval from Liberty University and site permission from the K-12 charter school incorporation Chief Educational Officer, all employed teachers, up to 190, were invited to participate in the study via email.

In total, 24 teachers responded. The researcher collected informed consent from 18 teachers, resulting in a final number of 16 participants. The 16 candidates participated in all three data collection methods: the semi-structured interview, object discussion, and in-person focus group meetings. For each method, data was collected in person and via Microsoft Teams to fit the candidate's schedule.

The researcher has a current CITI certification and receives no financial or otherwise gains from conducting the research. The data was stored on a password-protected computer that no one else could access. The researcher used qualitative data analysis software, NVivo 14, to aid the data analysis process and derive themes from codes with the highest frequency using theory as a lens.

Researcher's Positionality

The interpretive framework suited to my position as a researcher is social constructivism because, through it, I assign meaning to the world concerning my lived experiences, including both where I live and where I work (Denzin & Lincoln, 1994). Like hermeneutic phenomenology, social constructivism seeks to find meaning through people's personal and subjective experiences and views, such as the research study participants (Naidoo & Mabaso, 2023). Social constructivism is well partnered with hermeneutic phenomenology because both "borrow" the experiences of others to find more profound and more significant meaning in the world (van Manen, 2015).

Interpretive Framework

The qualitative methodology of hermeneutic phenomenology permits the researcher to understand and interpret participants' lived experiences. Before delving into the research study's findings, the reader must understand how my thoughts and behaviors influence my personal beliefs and biases, acting as a lens through which I view the world (Smith, 2020).

I am the middle of three siblings and a first-generation college graduate. My younger sister earned her college degree in adulthood, four months before succumbing to breast cancer. My older sister graduated from high school and stayed home due to her disability. My parents both dropped out of high school in their teenage years to earn their general equivalency diploma (GED) in adulthood. My parents are determined and hard-working individuals who inspired and motivated me from an early age to pursue my education. I grew up believing in the power of education even though I did not have a role model with higher learning to whom I could look, so I found my role models at school as teachers.

While still in grade school, I decided, rightfully so, that I would become a teacher. Thus far, I have been in school my entire life, whether as a student, teacher, administrator, instructional specialist, or curriculum coordinator; I have dedicated my life to pursuing education for myself and my students. I have been a teacher leader in middle and high schools, and the teacher leader role has been the best professional development I have ever experienced. Teacher leadership empowered my personal growth as an educator and a leader, and this is why I earned my master's in educational leadership and, finally, my doctorate. Although I no longer have a classroom or students, I still consider teacher leadership my responsibility and duty. On every possible occasion, I champion teacher leadership.

Therefore, this research study on how teacher leaders are motivated by physical artifacts holds excellent personal value because I see the vitality of teacher leadership diminishing under the strain of increased workload and responsibility. Teacher leadership is valuable to education, and it is incumbent upon educational researchers to uncover ways to fill the gaps in the literature, like teacher identity and motivation, and solve the pervasive problems, such as burnout and attrition, facing the field. This research study aimed to present the experiential reality of teacher leaders' lifeworlds (van Manen, 2015) through the theoretical framework of thing theory and is a work of human science research and the heart, which Rousseau says provides surer insight than reason (van Manen, 2015).

Findings

This hermeneutic phenomenological study explored how physical artifacts motivate teacher leaders at a K-12 charter school system in the rural Southeastern United States. The seminal work of York-Barr and Duke (2004) defined teacher leadership as the individual or collective manner by which teachers influence peers, principals, students, and stakeholders to improve instructional practices to increase student achievement. The theory framing this study is thing theory (Brown, 2001). Table 1 provides an overview of the study's themes, sub-themes, and codes.

The study revealed the lifeworld of the teacher leaders and how they are motivated by physical artifacts. The triangulation of data collection methods provided rich evidence revealing themes and sub-themes expressing the lifeworld of the candidates. Data analysis uncovered three themes with two sub-themes each. The themes and sub-themes follow:

- Inspired Leadership Embracing Growth with the sub-themes Motivating and Challenging and A Bridge to Connection
- Personal Connections Facilitating Engagement with sub-themes Sense of Belonging and Reflection and Emotional Connection
- Small Victories Confirming Effort with the sub-themes Accomplishment and Ownership and Affirmation of Effort

Table 1: *Themes, Sub-themes, and Codes*

Themes	Sub-Themes	Codes
Theme 1 Inspired Leadership Embracing Growth	Motivating and Challenging A Bridge to Connection	Belief in Self, Leading with Peers, How I changed, Where TL Happens, Answering to Others, I Can Do It, Confidence, Experienced Teacher, Collaborative Culture, Lending a Hand, Influencing Peers, Leading

		in the Classroom, Modeling for Peers, Modeling for Students, Practical Use, Taking Initiative, Improved Job Satisfaction, More Work and Stress, Teacher Leadership Behaviors, Trusting Relationships, Purposeful Planning
Theme 2 Personal Connections Facilitating Engagement	Reflection and Emotional Connection Sense of Belonging	Evidence of Student Learning, Improving Learning, Close Relationships with Students, Curriculum and instruction, Encouraging Students, Any Signs of Growth, Applying Learning to Real Life, Reaching Goals, Student Grades, Handwritten Notes from Students, Students Share Feedback, Students Gave it To Me, Very Important to Me
Theme 3 Small Victories Confirming Effort	Accomplishment and Ownership Affirmation of Effort	Confirms My Career Choice, Motivating, Feeling Good, Delegating Tasks to Peers, Uncertainty about Leading Peers, Being Just the Leader, Frustrating, Self-Doubt, Greater Responsibility, Highly Stressed, Improved Job Satisfaction, Keeps Me Going, Leading Peers, Just the Leader, Uncertain about Leading, Monitoring Students, Challenging, Types of Physical Artifacts, Notes and Cards from Students and Colleagues

Inspired Leadership Embracing Growth

All rounds of data collection, including the semi-structured interview, object discussion, and in-person focus groups, created evidence supporting theme one. All 16 participants referenced theme one in their interviews and discussions. The data collection resulted in the most significant references to this theme, with the richest quotes allowing for a deeper understanding of the lifeworld of teacher leaders and how physical artifacts motivate them. Theme one revealed that the role of teacher leadership nurtures inspiration within the teacher leader through the experiences of facing and overcoming challenging situations, resulting in motivation and fueling future success. Further, the role of the teacher leader allows the leader to build bridges of connection with students, peers, and stakeholders. Lilly Marie, a second-year teacher, said, "Everyone needs to feel supported." She also wanted to reassure others that they were "doing things right" and ensuring students and peers were "seen and heard." Jennifer, an 18-year veteran teacher, shared her goal of "doing what is best for the section" and "showing positive examples" in a teacher leader's classroom. Jennifer directly addressed the sub-theme of motivating and challenging when referring to "not bossing" and leadership opportunities requiring her to be "assertive" and to "pick their battles."

Lisa, a veteran teacher with over 30 years of experience, shared about leadership in the classroom. She does not tolerate misbehavior in the classroom and takes care of student behavior without the aid of the school administration. This information directly relates to the motivating and challenging experiences of teacher leadership. With this quote, Lisa also shared additional challenges related to leading peers, "I have been privately a mediator between folks." Moreover, Lisa shared experiences of "there are haters" and teacher leadership of peers "being more collaborative than leadership." Most importantly, Lisa shared their inspiration and motivation for students to have fun in class so they "would come to school every day" and the utmost desire to "keep their team together."

Trusting relationships, a nuanced code supporting theme one and the sub-theme of bridges of connection, revealed how teacher leaders forge relationships with students and peers. A veteran math teacher, Bethany, shared how

students who hate math love her class. Courtney, another veteran math teacher, shared her goal of making students comfortable in class, and Debra, another veteran math teacher, repeatedly emphasized her goal of building a classroom community. While math can be daunting for some students, these math teacher leaders work hard to build bridges of connection, embracing growth.

Improved job satisfaction, a code with 52 references, included phrases such as, "I do not feel like I will get burned out" and "You cannot associate teacher leadership with extra work." Several teacher leaders in the study referred to emotional well-being and how they maintain self-care. Bobby, a third-year high school electives teacher, said, "I mentally prepare for what I need to do beginning on Sunday afternoon." Courtney shared how she prepares for school, so they do not have to bring work home. Further, Courtney shared that her leadership goal is to retain teachers by helping them reduce their workload. Lisa shared the decision to not "dabble in too many things," thereby protecting herself from burnout.

Directly related to the embracing growth aspect of theme one, *belief in self*, a dense code with 65 references revealed that teacher leaders experience self-efficacy and have confidence in their abilities. Related to this, teacher leaders shared words such as "self-fulfilled," “proud of myself,” “I feel important,” “I positively affect others,” “More confident,” “Gave me a little boost,” and “I am doing what I am supposed to be doing.” Although teacher leadership of students and peers can be challenging, teacher leaders experience inspiration through leadership, which results in growth.

Personal Connections Facilitating Engagement

A triangulation of data supports theme two with references from each data collection method. Theme two exemplified the lived experiences of teacher leaders by capturing the essence of personal connection through the sub-themes of reflection, emotional connection, and sense of belonging. Teacher leaders create personal connections through academic means such as instruction and learning, as shown by the codes, with 73 references related to *evidence of student learning*, *curriculum and instruction,* and *student grades.* For example, the following descriptions capture the essence of the codes, student data related to testing, meeting the goals set by behavior plans, feeling emotionally secure, bridging gaps in academic learning, and students showing progress and mastery of content. However, the most powerful method of facilitating engagement occurs through reflection, emotional connections, and feeling a sense of belonging. The emotional connections created by teacher leaders significantly impact the engagement of peers and students. Emotional connections confirm the leader's career path and forge strong and lasting bonds, inducing feelings of belonging for the teacher leader and the recipients of the teacher's leadership. To this end, Pam shared that "Empowering students to become problem solvers" facilitates engagement. During the object discussion, Elizabeth stated, "[Physical artifacts] state I made a difference in somebody's life."

The study participants with the most to say about these two were Debra, with 32 references; Elizabeth, with 25 references; Jillian, with 15 references; and Hayley, with 16 references. Debra shared that the satisfaction she experiences from teacher leadership is "verification that I am doing what I am supposed to be doing.” Further, Debra shared that she desires to instill faith in her teaching ability and that student learning is the reason she teaches directly relating to the sub-theme of sense of belonging. Elizabeth, regarding the object discussion and collection of physical artifacts, said many of the objects she collected throughout her 40-year career are notes written by former students who struggled and succeeded in her math class. A veteran math teacher, Jillian, shared that she collects and rereads handwritten notes from students, parents, and administration because they "encourage her to be a good teacher." A novice teacher, Hayley shared how she monitors student progress through "conversations with students" and “happy mail notes.” The physical artifacts shared during the object interview exemplify a sense of belonging for teacher leaders.

Influencing students, a parent code with 245 references included child codes referencing the ways teacher leaders influence students. The study revealed ways of influencing students, including *trusting relationships*, *evidence of student learning*, *encouragement of students*, and *handwritten notes*. Relating the emotional influence exhibited by teacher leaders, Lilly Marie, during the object discussion, recounted a story about her first-year teaching as a preschool teacher and a challenging situation with one student. The student, formerly combative, grew to trust Lilly Marie, and the physical artifact chosen for the object interview, a silly, seasonal headband, was the vehicle for building that trust. Lilly Marie shared how she allowed the student to wear the headband and how the gesture sparked a trusting relationship. She went on to say that, although she teaches high school now, she wears the headband as a reminder of the first powerful experience of winning her student's trust. From a different point of view, Marie, a veteran high school English teacher, shared how she works to find ways to help her students achieve and do well. Marie related an example of personal connection and facilitating engagement by influencing students by creating a data sheet collecting students' answers to questions about what motivates them to learn. Marie shared

student answers such as "ice cream" and "using headphones." Teacher leaders maximize the power of their influence to create personal connections and facilitate engagement.

Small Victories Confirming Effort

Theme three included references from all three data sources, resulting in data triangulation. Theme three depicts the dual nature of teacher leadership by exploring the notion of small victories. Small victories often yield compromises, yet teacher leaders view them as proof that personal effort wins. The sub-themes of accomplishment and ownership and affirmation of effort portray the essence of teacher leadership through codes such as *keeps me going*, illustrating how the objects collected by teacher leaders incite them to keep working because the objects "show they love me too." The code *motivating* supports the sub-theme of accomplishment and ownership by apprehending how teacher leaders view the work of leadership. Regarding the code *motivating* and the sub-theme affirmation of effort, the study participants used words such as "genuine," "warm feelings to my heart," and "I mattered."

In *leading peers,* a code with 66 references, Harper, a veteran teacher secondary teacher, shared about mentoring a novice science teacher, trouble-shooting with experienced colleagues, and promoting positive behavior through positive feedback. Heather shared that teacher leadership means engendering "followership" among students and peers. Stanley, a third-year teacher, shared how he finds leading peers whose experience exceeds his challenging. Conversely, Pam called for "training sessions" on teacher leadership and more teacher leaders in general. In that vein, the competing ideas of *delegating tasks to peers*, *uncertainty about leading peers*, and *being just the leader* add layers of meaning to theme three. Lisa shared that she "likes to delegate more." Considering feeling uncertain about leading, Marie mentioned "self-confidence" as an issue. In the in-person focus group, Heather and Elizabeth shared that the best leaders "treated me as an equal." The code, *leading peers*, offers insight into the small victories that confirm effort for teacher leaders.

Challenging, a code with 31 references and *confirms my career choice*, with 33 references, relates the elements of effort, accomplishment, victory, and affirmation within the contradictory lifeworld of teacher leaders. Bethany shared about her physical artifact, a toolbox, and how it symbolizes what she tries to do for students and peers. Autumn shared that the written feedback she gets from students is "humbling" in sincerity. Debra said her physical artifact, a quilt with a motivational quote, challenges her "to go for it every day." Elizabeth, relating how student behavior can be challenging, said some students for whom math was hard were "goofy," yet she ended the sentiment by saying they made "me laugh." The physical artifact was integral to the code and *confirmed my career choice* because it physically confirmed the influence and leadership of the teacher leader.

Table 2 follows, listing participants, years taught, words describing the artifact, physical artifact, and grade level taught. Following Table 2, a short narrative provides more information about the object discussion and how the research study answered the central research question.

Table 2: *Participants and Physical Artifacts*

Teacher Participant	Years Taught	Words Describing Artifact	Physical Artifact	Grade Level
Debra	30 +	Treasure, inspirational, reflection	Inspirational hanging quilt from parents from first-year teaching	9-12
Autumn	1	Humbling, empowering, sweet	Notes and pictures from students from first-year teaching	6-12
Harper	16	Vital, fluid, neat	Portable, paper calendar	6-12
Jennifer	18	Encouragement, a breath of fresh air, a reminder	Holy Bible	6
Marie	15	Research-based, useful, inspirational	Table of student motivators, self-created	10
Heather	8	Sentimental, fulfilling, sad	Manilla folder kept in classroom with notes from stakeholders	6-12
Bobby	3	Connection, feel good, personal	School yearbook with handwritten notes from students	9-12
Lisa	32	Special, relevant, funny	Kitty paw pointer from student	5

Bethany	26	Portable, resource, adapt, organized chaos	Toolbox with tools inside inspired by her father	8
Stanley	3	Empathy, caring, motivate	A note left by student from first year teaching	6-8
Elizabeth	42	Uplifting, motivating, and treasured	A box of student letters from first year teaching	9-12
Hayley	1	Special, heartfelt, and honest	Flashback Friday student worksheet	2
Pam	20	Delicate, unique, and ongoing	Seashell reference book	6-8
Courtney	27	Confidence, relevance, and intelligent	Cross-curricular student math unit, self-created	7-8
Jillian	18	Motivating, heartwarming, good	Folder of things collected from first year of teaching	6-12
Lilly Marie	2	Perseverance, empathy, joy	Seasonal, silly headband from self-bought	9-12

Debra

Debra is a veteran math teacher with over 30 years of experience. She used the words *treasure, inspirational,* and *reflection* to describe her physical artifact. Debra's artifact was a hanging wall quilt with an inspirational saying stitched into it. The saying follows, "Good, better, best! Never let it rest until your good is better and your better is best." Debra explained how her mother, a non-quilter, now in her late 80s, quilted that for her to hang in her first classroom over 30 years ago. She shared how the quilt has decorated each of her classrooms throughout the years and how the inspirational saying has become her motto. Debra related the story of receiving the quilt with tears in her eyes because her dad had passed away and charged her with not stopping until her better was best. She mentioned how she often points it out to students when they struggle and nostalgically recalls her dad's voice. While relating this story, Debra brushes tears from her eyes. For Debra, the physical artifact evokes memories of transitioning into adulthood and how her parents "sent" her off to work. The artifact motivates her to do her best for her students because that is what her daddy, an educator like her, would have wanted.

Autumn

Autumn is a new teacher with only one year of experience. She used the words *humbling, empowering,* and *sweet* to describe her artifacts. She had two artifacts: a handwritten note from a student explaining why she was her favorite teacher and a note with a doodled picture saying how she was the number one teacher. In the object discussion, Autumn directly answered how the physical artifact motivated her when she related how the artifacts confirm "why she does this." She also shared how, should she stop receiving physical artifacts like these, she would have to "re-evaluate" herself.

Harper

Harper is a veteran teacher who is currently not assigned to students. She used the words *vital, fluid*, and *neat* to describe her physical artifact, a portable paper calendar into which she pencils crucial, time-sensitive information. For her, the artifact symbolizes how she is a role model for students and teaches them to be responsible with their time by modeling the attribute herself. The physical artifact motivates her because it reminds her of a critical attribute she must model for her students and those around her.

Jennifer

Jennifer is a veteran teacher at the middle school. She used the words *encouragement, breath of fresh air*, and *reminder* to describe her physical artifact, the Holy Bible. She related a story about how she was a member of an unhealthy teaching team, and the bible encouraged her to be to others what she needed during that negative time in her life. She said teaching and leading in middle school is challenging, but the bible motivates her through encouraging and soothing scriptures.

Marie

Marie is a veteran high school English teacher. She used the words *research-based*, *useful*, and *inspirational* to describe her artifact, a self-created spreadsheet of students' self-reported items describing what would motivate them to participate in class. Marie said the artifact inspires her to do more for her students, answering the central research question.

Heather
Heather is a veteran high school English teacher in the Exceptional Student Education department. She used the words *sentimental, fulfilling*, and *sad* to describe her artifact. Her artifact was a folder of handwritten notes, cards, and pictures from students, colleagues, and parents. She pulled three different artifacts from the folder and shared stories related to each. She shared how the artifacts remained with her for motivation even though she recently moved classrooms. She directly answered the central research question when sharing how the artifacts belonged to her so she could access them when she had a "hard" day. Interestingly, Heather described her artifact as sad because she thinks it sad that she needs something like an artifact for personal affirmation when she works so hard as a teacher leader.

Bobby
Bobby is a third-year electives teacher in high school. He used the words *connection, feel good*, and *personal* to describe his artifact, a high school yearbook with handwritten notes from students. Bobby's eyes were full as he described what it meant to him that students took the initiative to write in his yearbook on their own time. The artifact motivates him because it shows that he did reach a few students.

Lisa
Lisa is a veteran elementary teacher who used the words *memorable, relevant*, and *funny* to describe her artifact, a pointer with a kitty paw at the end of it. She shared that a student bought it for her one year when she took her class to the book fair. Lisa said it was a surprise. She uses it for practical purposes, such as pointing out things with a dash of humor. Related to the central research question, the physical artifact motivates Lisa to instill humor into her lessons by reminding her that she teaches children who look up to her.

Bethany
Bethany is a veteran teacher currently teaching middle school math. Her physical artifact was a tool box containing typical tools. She used the words *portable, resource, adapt*, and *organized chaos* to describe her artifact. She shared how her dad inspired her to have her toolbox at school and how she helps many teachers during preschool planning when decorating classrooms. However, she related the symbolic meaning of the toolbox regarding teaching and learning math and the need for tools to complete the work. She also related the symbolic meaning of the toolbox and how it is a connecting point between her and other teachers who now see her as someone to rely upon for help. In answer to the central research question, Bethany's toolbox motivates her to provide what others need when they need it.

Stanley
Stanley is a third-year electives teacher at the middle school level. His artifact was an anonymous student note left behind on his desk. He used the words *empathy, caring*, and *motivate* to describe the note. The note said, "The way I see it. If you want the rainbow, you must put up with the rain." He said the note arrived by "cool timing." Stanley said he references the note every few weeks when he "is not having a good day." Stanley's artifact motivates him because it shows that someone "did care."

Elizabeth
Elizabeth is a veteran teacher with over 40 years of experience. She brought a few handwritten notes and cards from a more extensive collection she keeps at home. She described the artifacts as *uplifting, motivating*, and *treasured*. She stated that she has been collecting artifacts like these since her first year of teaching. The physical artifacts motivate Elizabeth because they tell her why she teaches and encourages her when she questions whether she is making a difference. When asked to read from one of the cards, Elizabeth begins only to stop with tears in her eyes, saying it is too "emotional" for her.

Hayley
Hayley is a novice elementary teacher, and her artifact was a Flashback Friday student handout, which she described as *unique, heartfelt*, and *honest*. Hayley shared how the handout proved she could help a student make friends in class. During the object discussion, Hayley shared about the student to whom the handout belonged. The student was struggling to make friends. The handout related to Hayley and how the student made "great friends." This year, Hayley challenged herself to work on the social-emotional learning of her students, and the artifact proved that she achieved her goal.

Pam
Pam, a veteran teacher, chose a seashell reference book as her physical artifact. She described it as *delicate, unique*, and *ongoing*. Pam symbolically related the seashell and its growth to teacher leadership and the influence of a teacher leader. She expressed how the seashell is a “metaphor for beauty and uniqueness in handling other

humans." Pam's physical artifact motivated her because it figuratively reminded her to handle her students carefully.

Courtney

Courtney is a veteran middle school teacher whose physical artifact was her first self-created cross-curricular project. She described the artifact as *confident*, *relevant*, and *intelligent*. She explained how and why she developed the unit on her own and how her students engaged with it. The artifact is significant because it was her first unit of that type. Since then, Courtney has created several units, which she posted online for free teacher use.
Courtney's physical artifact motivates her to believe in her ability to create learning units for students.

Jillian

Jillian, a veteran secondary teacher, brought a few handwritten notes from students, colleagues, and administrators as her physical artifact. Jillian described the artifacts as *motivating*, *heartwarming*, and *sound*. Jillian shared the importance of her artifacts by describing how her file of artifacts follows no matter where she moves as a military wife and teacher. She also files the artifacts next to her tax documents. Like Debra and Elizabeth, Jillian grew very emotional when reading from her artifacts. Jillian shared that she thinks every teacher should have a folder of artifacts and work to be the teacher the artifacts describe.

Lilly Marie

Lilly Marie is a second-year high school teacher whose artifact was a silly, seasonal headband that she described as *perseverance*, *empathy*, and *joy*. She recounted how the artifact was integral in helping her build a trusting relationship with a struggling student. She keeps the artifact to remind herself when having a "really bad day" that what she does matters.

Conclusion

The research study corroborated several existing empirical findings in teacher leadership research. To begin, teacher leaders experience many positive outcomes, including earning legitimacy from peers, such as Harper's mentorship of new teachers. Legitimacy occurs when peers recognize leadership in the classroom next door (Bezzina & Bufalino, 2019; Harris & Jones, 2022) and seek help from those with the necessary "toolbox" like that belonging to Bethany. Another positive outcome of teacher leadership is individual and collective improvement experienced through self-efficacy and collective efficacy (Donohoo et al., 2020; Goddard et al., 2021). For example, Lisa's desire to keep her team together and the codes referencing improved pedagogy. Further, as expressed in the themes and sub-themes, teacher leadership embodies various behaviors and nuanced meanings (Nguyen et al., 2020; Pan et al., 2023; Schott et al., 2020; Wenner & Campbell, 2017).

The study addressed burnout-related factors through all three themes and sub-theme groupings. While the physical artifact and the object discussion do not offer an overall solution to teacher burnout and subsequent teacher attrition, the lived experiences expressed by the study's participants provide insight into why teachers stay (Marcionetti & Castelli, 2023). Further research into making every teacher a teacher leader must occur to maximize the influence of teacher leadership for all stakeholders, but most importantly, the teacher leader. Further, for the teacher leader, the physical artifact is a tangible reminder of why they teach. When teachers have bad days, the physical artifact lifts their spirits, reminding them that they make a difference and have the skills to complete the job. Teacher leaders express great resiliency; the physical artifact is a touchpoint for that resiliency. The artifacts hold material potency (Mozely, 2023), expanding the understanding of the lifeworlds of teacher leaders and creating relational bridges (Thorpe et al., 2024).

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How Principal Leadership Affected ICT Integration in Antiguan Secondary Schools: Successes and Challenges

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ABSTRACT
The present article focuses upon particular findings from a mixed-methods study that examined the leadership strategies Antiguan school principals employed to incorporate technology into the teaching and learning process. The aim was to provide greater insight into these strategies, as well as, to identify some of the successes and challenges associated with the incorporation of ICT by these secondary school principals. This study was anchored by the International Standards for Technology in Education (ISTE) model, an established technology leadership theoretical framework. Qualitative data were gathered from school principals and teachers through the use of semi-structured interviews (N=27). Furthermore, the qualitative data were manually coded and subjected to thematic content analysis. Regarding ICT integration, findings on leadership strategies highlighted a number of developing themes related to successes and challenges, in areas such as communication with key stakeholders, ICT resource allocation, attitude of educators towards ICT integration, and administrative activities.
Keywords: Principals leadership, ICT integration, ISTE standards

INTRODUCTION
ICTs are now an integral part of the curriculum in many secondary schools (Mogas et al., 2022). The recent Covid-19 pandemic proved that technological integration was crucial. School administrators in this context must therefore be strategic technology leaders that promote the use of technology in the classroom (Thannimalai & Raman, 2018). Moreover, school administrators face the challenging task of integrating technology into the curriculum in order to enhance teaching and learning in 21st-century classrooms (Thannimalai & Raman, 2018). Nevertheless, many countries, especially developing ones and those with limited financial resources are making significant investments in education through ICT (Mogas et al., 2022). Consequently, schools must present a solid rationale for making such an investment. This article presents an examination of some of the findings from the integration of ICTs in Antiguan secondary schools.

LITERATURE REVIEW
ICT integration in education has had an incredible impact and has been acknowledged as one of the major factors influencing the learning process (Prasojo et al., 2019). An educational setting that prepares students for the realities of the modern technology dispensation is not only critical, but fundamental to the smooth operation of society (Harrell & Bynum, 2018; Schindler et al., 2017). In view of this, the Fourth Industrial Revolution demands that school administrators and educators alike be proficient and fully cognizant regarding technology related concerns (Raman et al., 2019). On the other hand, if educators and school administration are uneasy or fail to possess the necessary technological integration abilities, students will suffer (Krawchuk, 2022; Waxman et al., 2013). Therefore, in order to support digital natives in their classrooms, school principals must constantly evolve. Notwithstanding this, a significant number of school administrators and educators continue to use antiquated techniques in their curricula, which is concerning (Harrell & Bynum, 2018). These factors situate the current study, which aims to identify the context and content of principal-led technology integration in Antiguan secondary schools. It also aims to highlight the successes and challenges of these principal leadership strategies.
To promote educators' use of technology in the classroom, school administrators must be well-versed in how technology might enhance pedagogical techniques (Garcia et al., 2019; Waxman et al., 2013). In order to effectively manage the integration of technology to enhance learning, school administrators must also be innovative thinkers (Ugur & Koç, 2019). Furthermore, since our world is becoming more and more perceived as globally connected, educational leaders must proficiently embrace the modern technology landscape (Hamzah et al., 2016). Therefore, it is imperative that school leaders create cutting-edge, modern institutions of learning that provide outstanding educational possibilities to every student (Hamzah et al., 2016).

Education administrators must lead by example in incorporating technology into everyday tasks (Ugur & Koc, 2019). If school leaders are well-acquainted with the appropriate use of technology, then teachers and students are more likely to embrace it (Ugur & Koç, 2019). School administrators must first encourage, then skillfully model the use of these instructional resources as the first step in incorporating technology into the classroom (Shyr, 2017). Moreover, in order to improve teachers' digital competency and pedagogical efficacy, educational administrators must plan, coordinate, and supervise their institution's technological initiatives (Waxman et al., 2013). There must also be cooperation between educational technology staff and school administration for optimal educational outcomes (Ugur & Koç, 2019). Ultimately, joint efforts among all stakeholders are necessary to optimize the integration of ICTs in the education eco-environment.

Additionally, the body of research clearly indicates that ICT integration has numerous advantages for academic institutions, as well as principals themselves. Teachers and students now have easier access to significantly more modern learning resources and tools thanks to technology (McKnight et al., 2016). Students can learn in a variety of ways when ICT is used in the educational process (McKnight et al., 2016). They also have more control over their education when technology is utilized in the classroom (Ruloff & Petko, 2022; Yarbro et al., 2016). ICT integration also affords students tailored and diversified learning opportunities (McKnight et al., 2016). ICT-enhanced learning environments also enhance students' ability for a better understanding of the learning process than standard classroom settings (Uygur et al., 2020). Similarly, through online forums, digital communications, and interactive websites, technology can be leveraged to enhance student feedback and communication (McKnight et al., 2016).

ICT integration in schools also pose notable challenges. One such concern for school administrators is learning how to use appropriate technologies for communication, instruction, and administration in an effective manner (Schrum & Levin, 2016). While many western countries have widespread access to ICTs in their classrooms, only a small percentage of teachers reported utilizing them in teaching (Shemshack, 2021). Regretfully, instructional tools are not equally accessible to all schools (Sincar, 2013). Moreover, school administrators are only somewhat prepared to establish contacts outside of their institution, which is a limiting factor in facilitating the effective use of technology (Esplin et al., 2018). Furthermore, studies indicate that bureaucracy has impeded the advancement of instructional technology (Sincar, 2013). Another disadvantage that affects educators and school principals is a poor understanding of the usefulness of an ICT resource which can significantly limit its efficacy (Claro et al., 2017). It should be noted that when technology leadership is applied in education, the problem is not always the hardware, computers or e-learning infrastructure but rather the attitudes and behaviors of the leaders, the organizational philosophy, the readiness of the staff, and the staff members' resistance to change (Chua & Chua, 2017). ICT integration ultimately necessitates a high degree of dedication, support, and active participation from school administration; otherwise, initiatives for implementing new technologies will fail. Given this context for ICT integration in schools, the research questions below emerge.

Research Questions:

1. What Principal Leadership Strategies were used for ICT integration during and beyond Covid 19?
2. What successes did principals and teachers identify as a result of the ICT integration?
3. What challenges did principals and teachers identify as a result of the ICT integration?

METHOD

This study was built employing the NESTS-A theoretical leadership framework. The study population consisted of approximately 769 teachers, 18 deputy principals, and 12 principals. In total, 27 semi-structured interviews were conducted with two teachers from each school (n=18) and nine out of twelve (9/12) school principals, or 75% of public secondary school principals. The researcher thought that 27 interviews would be adequate to reach data saturation, which is the point at which learning more about a problem would not provide any new information (Hennink & Kaiser, 2022). To collect qualitative data from participants, the researcher used a purposive sample approach. Based on the researcher's judgment of who will offer the most useful information to achieve the study's objectives, this sample plan was formulated (Etikan & Bala, 2017). According to research, there is no minimum or maximum number of participants needed for this nonrandom technique (Etikan et al., 2016).

Participants

Pseudonyms were assigned to each participant to protect their identity. Teacher participants were identified as T1, T2…to T18, whereas principal participants were identified as P1, P2, ...to P9. Out of the nine principals, four were male and five were female. Five of the principals were between the ages of 36 and 50, while the remaining four were beyond 51. Two of the principals had more than 20 years of experience, while the majority, six, had over 30 years of experience in the field. Among the teacher participants, there were three males and fifteen females. Twelve teachers were between the ages of 36 and 50, five were in the 20–35 age range, and only one was older than 51.

Teacher participants included deputy principals, social studies, IT, Math and other educators. Teacher participants have been teaching at their current school for a minimum of one year, and a maximum of 19 years.

Data Collection and Analysis

The Ministry of Education, the research sites, and the Institutional Review Board (IRB) at the University of Trinidad and Tobago all granted the necessary permission in order to carry out this study. These relevant authorities were consulted verbally, in writing, and through electronic means during the approval process. Participant consent forms were then prepared for distribution. Once study participants received and signed the consent forms, the data collection process began. Teachers and school principals were scheduled for in-person interviews at a time and location that best suited them. Depending on the availability of the respondents, the sessions were held on the school premises during regular school hours. The approximate start and end times of the interviews, which went up to an hour were also disclosed to the interview subjects. Participants were asked for their prior consent before audio-visual recoding and a verbatim transcription of the sessions could begin. In addition, participants were informed that they are free to withdraw from the study at anytime without consequences.

After the interviews were concluded, the researcher utilized a Microsoft Word function to transcribe the data. Before continuing with the process, all participants received an email with the transcription of the data in the form of a Word document, so they could verify that the information was accurate. The qualitative data was then subjected to thematic content analysis. The six-step theme analysis approach described by Braun and Clarke (2006) was used. These consist of getting acquainted with the data, coming up with preliminary codes, looking for themes, going over themes, identifying and labeling themes, and writing the report (Braun & Clarke, 2006). One of the most significant steps within this process was for the researcher to immense himself into the data by reading and rereading in order to create a preliminary set of codes. From these codes, themes were developed and refined. Overall, the study revealed that while employing a range of leadership strategies to support the integration of technology into the curriculum, administrators faced both successes and challenges.

RESULTS

The qualitative analysis of the data from the principals and teachers' interviews revealed a number of themes in answer to each research question. Moreover, the themes were categorized under the broad headings of successes and challenges. Table 1 below captures themes in these categories, as well as those identified as the leadership strategies employed.

Table 1: *Emerging Themes from Principal and Teacher interviews*

Research Questions	Emerging Themes
	Principal and Teacher Interviews
1. What leadership strategies did school principals use to integrate technology in curriculum delivery?	**Principal Leadership Strategies** Theme 1- The Integration of Technology **Principal Leadership Strategies** Theme 2- Technological Resources and Infrastructure **Principal Leadership Strategies** Theme 3- Professional Development
2. What are the key success factors experienced by school principals concerning the integration of technology in curriculum delivery?	**Principal Success** Theme 1- Communication **Principal Success** Theme 2- Time-saving and paper reduction **Principal Success** Theme 3- Working remotely
3. What are some of the challenges faced by school principals concerning technology integration in curriculum delivery?	**Challenges faced by Principals** Theme 1- Inadequate Internet Infrastructure **Challenges faced by Principals** Theme 2- Insufficient ICT Hardware **Challenges faced by Principals** Theme 3- Teacher resistance

Emerging Themes from Principal and Teacher Interviews

RQ1- What leadership strategies have been utilized by school principals to integrate technology into curriculum delivery?

Three main themes emerged from participants' responses when asked about the strategies that school principals employed to integrate technology into classroom instruction, as shown in Figure 1. All participants collectively confirmed the development of these themes. By setting up staff ICT training and acquiring the necessary technology for the school, administrators would have tried to incorporate technology into the curriculum. A significant attempt was also made by school administrators to intentionally incorporate technology into the school's everyday operations.

Theme 1- The Integration of technology

The majority of participants identified deliberate and decisive technology integration initiatives for administrative, instructional, and communication objectives as a key leadership strategy that school principals used to incorporate technology into the curriculum. Research participants reported that in order to guarantee efficient coverage of subject matter, school principals actively promoted the use of technology throughout the school.

Communication Purposes

Any organization's management, including that of educational institutions, must prioritize effective communication. The majority of respondents highlighted the use of WhatsApp as one of the most often used forms of communication. This is an online social networking site where users may, among other things, make and receive phone calls and message one other. It is an easy-to-use platform that gives educators highly useful ways to communicate with each other. P7 made the following observations about using technology to further communication objectives by stating, "*when it came to reaching out to teachers, I used WhatsApp. I brought WhatsApp in because it was quicker to get to the teachers, even to parents, utilizing emails and WhatsApp."* Correspondingly, T13 observed, "*She (principal) has organized meetings via Google Meet. She's always using WhatsApp to reach us 24 hours, anytime she wants to reach us."* The utilization of such technologies for communication purposes is vital since both educators and school administrators must be able to quickly share information in order to get timely feedback that may aid with effective decision-making.

Administrative Uses

Additionally, the results showed that administrators and educators emphasized the value of using technology in administrative tasks. A significant number of school administrators have adopted technology to manage their institutions on a regular basis. P1 commented "*from the standpoint of school management, the Sydavi system is used for reports, keeping tab on our students in terms of classroom management, in terms of the number of students in class, particular classes, houses, their grades etc."* The administrative responsibilities of school principals include supervising employees, monitoring efficient classroom management, and keeping an eye on and disciplining students. ICTs may also prove very helpful for teachers in carrying out their numerous administrative responsibilities since they are also responsible for managing daily administrative duties including marking student registers.

Instructional Application

The results of this study showed that the most popular instructional technology used to support the school's curriculum was Google Classroom. P3 noted that "d*uring COVID, we all had to use the Google Classroom. So even though COVID is not so prevalent, we still continue to use the Google Classroom platform."* Educators also indicated that school principals monitored and supported educators' use of technology to achieve instructional goals. T16 commented "*She (the principal) encourages the staff to use technology, for example, the Google classroom, there is Onelearn. Teachers are encouraged to use projectors, they are encouraged to place lessons or videos, on the Google Classroom for students to use*." School principals in Antigua made sure that instructional technologies were strategically embedded in their schools with the goal of effectively delivering subject content, especially since the Ministry of Education had mandated that all public secondary schools use programs like Google Classroom when students were forced to stay at home during COVID-19.

Theme 2- Technological resources and infrastructure

Another leadership strategy that educators and school administrators both mentioned was the acquisition of ICT resources. In this regard, administrators saw the importance of lobbying the Ministry of Education, Board of Education, and other stakeholders in education to purchase the infrastructural and technological resources that were needed. In some cases, several school principals went above and beyond the call of duty, for example, P4 commented, *"we have tried to acquire those resources from computers to projectors, just about what you need to assist you in that process."* Another principal outlined the tactic of lobbying the Ministry of Education in an attempt to get them to put things in place so that the technology can actually work at the school. P2 remarked *"going into the Ministry of Education, encouraging them to put certain things in place in terms of getting the actual*

infrastructure in the school itself, so that the technology can be functional." Given that technology integration cannot be implemented without these ICT components in place, this leadership push to secure the necessary technological capacity is essential (Ruloff & Petko, 2022). Schools need laptops, projectors, smartboards, printers, and reliable internet access with enough coverage in order to achieve the required results (Raman & Thannimalai, 2019).

Theme 3- Professional Development

Lack of qualified professionals capable of successful technology employment is perhaps one of the biggest obstacles to fully integrating technology into secondary school curricula (Raman & Thannimalai, 2019). Frequent professional development helps teachers become more productive in their work and contribute more meaningfully to educational institutions. One crucial leadership strategy that school administrators used was to involve staff members in ICT professional development sessions. Many of the participants said that the administration of the school would have given teachers training on how to use Zoom, Sydavi, Google Classroom, and other tools, as well as how to integrate technology into the classroom more effectively. P9 expressed the opinion that "*we have had PD sessions, and they have been very successful in terms of not only the Google Classroom, not only how to utilize the Zoom platform. We've had training with regards to our Sydavi system and ChatGPT*." P6 remarked, "*we would have given teachers training every beginning of the school term, just to get them up to date."* Professional development activities led by school administrators should be planned to give teachers the opportunity to acquire and use new knowledge and abilities that will support them in facilitating learning and instruction (Day et al., 2020; Hero, 2020).

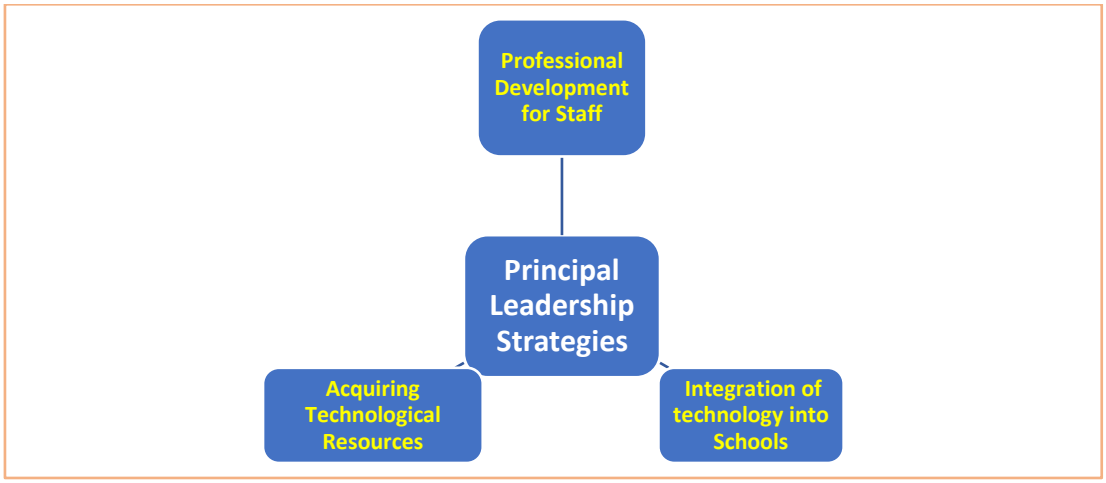

Figure 1: *Principal Leadership Strategies for Technology Integration*

RQ2- What are the key success factors emphasized by school principals concerning the integration of technology in curriculum delivery?

Theme 1- More Effective communication

More effective communication is made possible by technological integration, which is a major benefit that both teachers and school principals have noted in relation to the function of school leadership. To communicate effectively with all education partners, a significant number of school administrators rely heavily on technology. Through email and mobile apps, school principals communicate with educators, learners, and parents. The idea that technology dramatically improved communication speed and quality was endorsed by a significant number of participants. P2 believe that "c*ommunication has improved dramatically because I could just send a WhatsApp and the majority of persons are informed at the same time."* P8 likewise highlighted the efficacy of using technology to communicate. In terms of improved communication with stakeholders and staff members alike, technological tools have significant implications for all school principals (Saraih et al., 2022). P8 remarked "*as it relates to the successes of technology, one of them is that you're able to have real time responses, feedback, instant feedback, that's a plus in this setting*." T1 similarly noted that ICT integration enables for greater effectiveness in communication. This is a promising finding, given that a variety of modern technologies enable instantaneous response. Being a good communicator is one of a school administrator's most significant responsibilities, which makes the aforementioned theme crucial (Kempa et al., 2017). Since school principals regularly interact with teachers, parents, students, and a host of other stakeholders, this specific issue stands out as particularly important. Technology facilitates improved flexibility and collaboration with all stakeholders in education, as well as greater connectivity (Froment et al., 2017; Stronge & Xu, 2021).

Theme 2- Time-saving and paper reduction

Some participants felt that one of technology's most important features is its ability to do away with paper, while also saving time on mundane tasks. Electronic solutions allow for the faster completion of some tasks that were previously labor-intensive when done by hand. The fact that there is less need for paper is in line with Sustainable Development Goal (SDG) 12 of the United Nations. Goal 12 of the SDG places a strong focus on responsible production and consumption, especially in relation to the effective use of natural resources like trees (Chan et al., 2018). Cutting back on paper use in schools corresponds to saving trees, which is better for the environment. P2 stated "*we found it very beneficial to electronically post a lot of work, lessons and so on, on Google Classroom, which will eliminate all the paperwork, all the photocopying and save the trees*." Similarly, P1 expressed "*the use of the technology becomes alive again with CXC when we need to upload our students into the system for CXC, registering them for CXC, you are alleviating the paperwork*." Massive volumes of information can be entered, stored, and retrieved given the many functions that ICTs offer. Information technology has revolutionized storage with its blazingly quick read and write speeds. The electronic limitations of antiquated hard disk drives have been lifted by these technological developments, enabling quicker information access.

Theme 3- Working remotely

The success that school principals had from implementing technology was found to be closely associated with their capacity to work remotely. Technology has made it possible for teachers, administrators, and students to work remotely in a variety of ways. People can use asynchronous communication methods like videoconferencing and instant messaging services like WhatsApp, in addition to real-time communication. Teachers can work together as if they were on school property thanks to this. P7 remarked on this issue *"it makes my life a little easier using the technology. I can work from home."* Similarly, P2 emphasized the Zoom platform's ability to host remote meetings by stating "*I find the zoom platform, that has helped a lot, because sometimes persons are not able to be in the physical location.*" The ability to access fast internet from anywhere has completely changed the landscape of remote work. It makes it possible to communicate without interruption, share files, hold video conferences, and use cloud-based technology from almost anywhere in the world. P4 commented on the capacity of educators to work from home under this new dispensation, *"teachers can work from anywhere, they can work from their homes, they can send work for children at any point in time*." This specific theme has strengthened the notion that educators can now work from anywhere, even the comforts of their own homes, owing to advancements in technology. Unfortunately, giving students the choice to finish their work remotely may not always be beneficial since many of them may not have the same possibilities for peer interaction as they would in a traditional classroom (Winter et al., 2021). Additionally, there have been concerns expressed regarding students exploiting ChatGPT and other text-generative AI tools to plagiarize written assignments (Chan, 2023).

RQ3- What are some of the challenges mentioned by school principals concerning technology integration in curriculum delivery?

Theme 1- Inadequate Internet Infrastructure

Regarding technology integration, many educational institutions face a range of issues, such as a lack of technology policies, insufficient technological resources (Raman & Thannimalai, 2019), a shortage of teachers skilled in technology integration, resistance to innovation (Chua & Chua, 2017; Harrell & Bynum, 2018), and a dearth of opportunities for educators to pursue professional development (Chen, 2015; Chua & Chua, 2017). Three main themes emerged when participants were asked to explain the challenges faced by school principals when integrating technology. To begin with, most participants thought that principals lacked adequate internet infrastructure in their schools to encourage students to use technology effectively. P2 stated "*I think the infrastructure and the reliability of the internet. First, the infrastructure needs to be in place. We need the bandwidth."* Although there is frequent internet connectivity available on some school property, not all areas are properly covered, which poses a significant problem for teachers who work in those areas. P3 briefly remarked on this difficulty, "w*e don't have reliable Internet access*." Teachers likewise endorsed the administrators' responses on the issue of insufficient internet access in schools. T8 stated *"in the beginning, the Internet was very unstable. It is still not all of that some days."* This issue effectively highlights the fact that unless dependable internet connectivity is available, educators can do very little in the classroom, even with the best training possible.

Theme 2- Insufficient ICT Hardware

While many schools may have the opportunity to implement technology programs, there are a number of factors that affect how well technology is deployed in classrooms, one of which is a lack of adequate technology, including projectors, printers, smart TVs, IT lab space, and other items. A number of participants believed that in order to effectively encourage the use of technology in the classroom, school administrators had the difficult task of supplying adequate technological tools. P1 stated *"the limitation from the school standpoint, we only have one lab and so for us to really make the integration of technology a reality, there needs to be more facilities, computers."*

Due to a lack of devices, the usage of technological tools in some cases must be planned ahead of time, as P3 reported *"one of the problems with using technology at the school is that sometimes we have this book in which you have to be scheduling the use of the projector at this time, because we don't have enough."* It is critical to address the aforementioned issue if technology is to be used in classrooms efficiently. Even though educational institutions employ educators with experience implementing technology and have sufficient internet access in the classroom, these other factors will be useless if the ICT infrastructure such as computers, projectors, lab spaces, and other items are not in place.

Theme 3- Teacher resistance

Teacher anxiety was one of the significant issues that participants brought up in relation to the use of technology by principals. According to participants, teachers may be reluctant to employ technology because they are hesitant to try something novel. Many educators may find it challenging to change the methods they have been using in the classroom for years if they feel compelled to step outside of their comfort zone. This is because they may have become so accustomed to using tangible educational resources like textbooks, chalkboards, and the like. T7 observed, "*I don't know what it is about technology and teachers, I have found us to be one of the most resistant group of persons when it comes to the use of technology."* T9 believed that educators are opposed to change and unwilling to venture out of their zone of expertise. T9 asserted *"we are people who are averse to change, so we are accustomed to seeing it on the bulletin board, we don't necessarily want to check our e-mail. There's a lot of resistance against technology integration from staff*." There will be significant limitations on the use of technology in the classroom if educators are reluctant to employ it. Administrators in schools need to come up with creative ways to motivate teachers to use technology. An objective assessment of this anxiety among educators is necessary, as is the implementation of practical remedies to allay them.

DISCUSSION AND CONCLUSION

This study investigated the leadership strategies adopted by Antiguan public secondary school administrators to incorporate technology into the school's curriculum. Thus, the purpose of this section is to provide a brief discussion of these findings based on the data provided in the results section. The theoretical framework of NESTS-A provides a strong foundation for investigating these various concerns.

Principal Leadership Strategies

Theme 1- The Integration of technology

A primary leadership strategy employed by school principals to integrate technology into the curriculum was recognized by the majority of participants as intentional integration of technology for the purposes of ***administrative, instructional, and communication goals***. Principals were compelled to employ fresh approaches to outdated communication strategies. In order to interact with teachers, students and other educational partners more swiftly, messaging apps like Gmail and WhatsApp augmented traditional methods of communication such as email. According to these results, vitally significant methods of connecting with people needed to be explored in view of the communication difficulties principals had encountered as a result of the lack of face-to-face engagement brought about by COVID 19. By combining these new and old forms of communication to communicate with parents, educators, and students in real time, interpersonal relationships were improved and critical feedback was given more quickly. Research indicates that social networking platforms like WhatsApp gives individuals the chance to communicate constantly, both within and outside of the traditional classroom (Froment et al., 2017).

The results also showed that participants used technology when performing ***administrative responsibilities***. Some administrative duties, such as preparing student transcripts, storing data, and creating grade reports, were digitized by administrators and educators using a variety of technologies, including Google Classroom and the School Management System (SMS) Sydavi. Consequently, work may be done more quickly and with greater efficacy and efficiency. Even though the Covid 19 protocols were the primary driving force behind these findings, these administrative uses of ICTs remained in place even after the restrictions were lifted. According to research, SMS supports school administration procedures by increasing productivity, time management, resource utilization, and information accessibility (Leong et al., 2016). A number of participants also underlined the advantages of delivering the school's curriculum via Google Classroom and other pedagogical resources.

This study further indicated that educators, especially in the midst of the COVID-19 crisis, recognized that Google Classroom was an invaluable resource for assigning work and teaching students, all while reducing the need for paper. This resulted from educators in Antigua and many other parts of the world being forced to transition to virtual instruction during the Covid 19 era (Daniel, 2020). Studies have shown that most educators primarily utilize educational technology for communication and administrative purposes rather than for instruction (Depew, 2015).

However, the results of this study showed that by using strategic planning, school administrators helped educators to integrate technology into the classroom.

Theme 2- Technological resources and infrastructure

The procurement of technology resources was mentioned by the participants as an additional leadership strategy employed by school principals to improve curriculum delivery. Participants said that in order to provide educators and students with the tools they needed to properly incorporate technology into their classrooms, school administrators purchased ICT equipment, including PCs, laptops, smart televisions, projectors, printers, smart boards, etc. Participants confirmed that financial contributions from the school and business community, the Ministry of Education, the Board of Education, and alumni assistance were some of the different sources from which the ICT resources were acquired.

Participants cited the acquisition of technology resources as another leadership strategy that school principals used to boost curriculum delivery. Participants stated that educational administrators acquired ICT equipment such as PCs, laptops, smart televisions, projectors, printers, smart boards, etc. to give teachers and students what they required in order to appropriately integrate technology into their classes. Participants affirmed that among the various sources from which the ICT resources were obtained were financial contributions from the school and business community, the Ministry of Education, the Board of Education, and alumni support. Despite these efforts, the COVID-19 pandemic caused a decrease in per capita GDP in around 90% of the world's economies (Yeyati & Filippini, 2021). Therefore, the effort to acquire ICT resources was an enormous undertaking spearheaded by Antiguan school principals. Thus, in order to successfully integrate technology into classrooms, critical technology equipment was purchased (Rabah, 2015).

Theme 3- Professional Development

Hosting IT staff training was the last leadership strategy employed by school administrators to incorporate technology into secondary education. Administrators planned many ICT training sessions for teachers at various points throughout the academic school year, based on data from participants. Many educators were compelled to use Google Classroom and Zoom due to the unexpected worldwide increase of Covid-19 without the necessary training; yet, new skills and competences were swiftly gained. According to research, organizing teacher training sessions to ensure that educators can integrate ICT across the curriculum is one of the increasingly important duties of administrators (Hero, 2020). Given how quickly ICT is evolving, it is imperative that educators have access to appropriate professional development opportunities within the context of ICT (Albion et al., 2015).

Technology Integration Successes of School Principals

Improved Communication

The results of this study showed that administrators of schools routinely used a variety of communication channels as a leadership strategy to improve the integration of technology in the classroom. Furthermore, all participants concurred that the use of these communication technologies have improved communication in the educational setting. The use of WhatsApp, for instance, and how quickly it can deliver important information to the appropriate individuals were highlighted by participants. In order to connect with people who did not have access to WhatsApp, emails were also used. The study also discovered that, in contrast to setting up in-person meetings, employing technology allowed principals to connect with staff members more quickly, particularly in emergency situations. The capacity of administrators to communicate with staff and other partners in education outside of regular school hours is another advantage that participants mentioned. School principals needed more efficient means of communication in response to the Covid-19 pandemic, which drastically reduced face-to-face interaction. The results above showed that school administrators used technology to enhance communication; nevertheless, for the process to be successful, educators and students need to have sufficient access to digital devices and the internet in their classrooms (Ratheeswari, 2018).

Furthermore, to gain the trust of their employees, principals need to communicate truthful and reliable information (Tschannen-Moran & Gareis, 2015). According to research, teachers' attitudes about technology use are improved and students' understanding of it is enhanced when parents, students, and educators emphasize the value of incorporating digital tools for communication outside of the classroom (Blau & Shamir-Inbal, 2016).

Additionally, in order to acquire the confidence of their staff members, principals must communicate honest and accurate information (Tschannen-Moran & Gareis, 2015). Research has shown that when educators, students and parents place value on the importance of integrating digital technologies for communication outside of the boundaries of school, it boosted educators' attitudes and student learning regarding technology use (Blau & Shamir-Inbal, 2016). Research indicates that social media networks are becoming the preferred means of communication for Malaysian school principals (Saraih et al., 2022). The results showed that ICT media have

surpassed in-person communication in frequency and may even improve job performance and productivity in the office. The current study's findings thus demonstrate the significant effects that these technological tools have on school administrators across the board in terms of improved communication with stakeholders and staff alike.

Saving Time and Paper

Participants also mentioned that one benefit of technology for school principals was that it reduced the amount of time and paper needed to perform their tasks. This study showed that technology might be used to lessen the demand for paper by displaying notices, lessons, and other relevant information. This decrease in paper consumption aligns with Sustainable Development Goal (SDG) 12 of the UN. SDG 12 places a strong emphasis on responsible production and consumption, particularly when it comes to using natural resources like trees (Chan et al., 2018). It was agreed upon by participants that students might now register online using a portal for CSEC exams instead of utilizing paper forms. Furthermore, as the study's results showed, ICT integration made it possible to store and retrieve more material than was possible with traditional textbooks. The participants agreed that educational institutions, particularly secondary schools, can employ technology to create grades and class assignments, as well as to electronically record student absences and punctuality.

The aforementioned result indicates that school principals chose to share information predominantly online, particularly through Gmail and WhatsApp, instead of on paper documents, as a result of the physical restrictions imposed by COVID-19. According to research, students' use of digital technology led to time savings through quicker turnaround times, more instantaneous outcomes, and simpler task organization (Henderson et al., 2015). Instantaneous access to information technology in a number of domains is made possible by the internet, which eventually leads to increased productivity and time savings and is becoming an important tool for decision-making, particularly for school administrators (Szymkowiak et al., 2021). According to the study's findings, teachers can now work smarter than harder. It might very well signal the end of days for large filing cabinets, heavy books, and papers taking up unnecessary space.

Working Remotely

Finally, the results of the study showed that administrators could now work remotely thanks to technology. Through the effective use of technology, administrators are now able to effectively perform their jobs from locations other than the actual school. The findings of this research demonstrated that principals of schools can now have meetings, interact with personnel, and instantaneously distribute important information from the comfort of their homes or from any location, provided that appropriate internet connectivity is available. The absence of school principals due to illness or travel does not have to significantly interfere with the school's operations. Thanks to technology, important decisions may be made and communicated from any location in the world. This implies that a variety of administrative tasks can be carried out virtually. Once there are internet-connected devices, some level of work can be done even in the event of a pandemic, natural disaster, or other kind of disruption.

Schools were not required to stop all academic activities altogether during the Covid-19 pandemic. Technology like Google Classroom, Zoom, and WhatsApp allowed administrators and other users to continue working from home or any other location. Digital technology advancements for increasingly remote applications have generated enormous excitement (Henderson et al., 2015). Due to online learning, students can continue their education with little disruption to the regular learning process, even in the face of lockdowns and the incapacity to physically attend classes (Shamir-Inbal & Blau, 2021). Using e-learning to its full potential in educational institutions offers chances to improve efficiency, reduce costs, and increase flexibility (Lee, 2016). Administrators and schools may ultimately save money and become less wasteful by utilizing the remote benefits of ICT integration.

Challenges with Technology Integration Encountered by School Principals

Poor Internet Connectivity

The research found that schools' internet reliability and infrastructure were woefully inadequate. The participants agreed that there has to be a major improvement made to the quality and coverage of the internet within school premises. The study found that educators were frequently and for prolonged periods of time disappointed by the internet's unavailability. A participant said that the school did not have internet access for approximately a year. Participants also expressed concern over the internet's extremely poor performance when numerous people log on at once. Participants in the study indicated that poor internet connectivity significantly affected the communication and instructional processes both of which heavily depend on working technology. Internet stability and reliability play a major role in the successful integration of technology. The entire goal of technology integration is at risk if educational institutions' internet infrastructure is inadequate. The results of this study suggested that, even while school principals used a variety of leadership strategies to incorporate technology into their classrooms, one of the main obstacles they faced was the internet's unreliability. According to research, a number of schools in Northern Ontario did not have enough bandwidth to handle the amount of internet that students used, which made principals

think that the schools were failing (Chen, 2015). The findings of this study have consequences for government and educational officials working together to make sure that schools have the necessary internet service coverage and quality.

Inadequate ICT Equipment

Limited ICT equipment was another issue faced by school principals, much like insufficient internet connection. The limited physical space that school principals have to work with to effectively integrate technology was a complaint voiced by participants. In secondary schools, there is a growing need for more IT labs and technology such as laptops, projectors, and smart boards, according to the study's results. Participants contended that scheduling, sometimes on a first-come, first-served basis was necessary to ensure that ICT equipment usage was not oversubscribed in some schools. According to the study's findings, there were a number of instances where basic amenities like electrical outlets, which are required to power electronic devices were insufficient. In a learning setting, devices that cannot be charged cannot be used. This result implied that schools could not afford to buy adequate ICT equipment, most likely as a result of a shortage of funding.

During COVID-19, when national economies were crumbling, this problem was particularly severe. According to research, a major obstacle preventing administrators and teachers from using ICTs in schools is a lack of access to materials relevant to ICTs (Raman & Thannimalai, 2019). ICT integration in education requires large financial and budgetary efforts, which should go toward building new educational infrastructure, such as Wi-Fi connections, in addition to buying new hardware and software (Rabah, 2015). Despite having a strong technological infrastructure and being run in a technology-friendly manner, educational administrators still need to guide their institutions in this direction (Yorulmaz & Can, 2016). Aside from sufficient training for teachers and principals, suitable internet quality and ICT devices must be in place for school administrators to properly incorporate technology to support curriculum coverage.

Teacher Unwillingness

The last issue that principals of schools had to deal with was the resistance of educators to integrating technology. According to this study, certain educators were especially reluctant to use technology. The results of the study showed that a deficiency of ICT resources may have contributed to teachers' reluctance to adopt technology. Teachers shied away from ICT integration because they believed that schools lacked the necessary technology resources to carry out their duties. Participants emphasized the idea that some educators were more accustomed to teaching with books and chalkboards and were unwilling to put in the extra effort required for ICT integration. The results of the study indicated that some educators' resistance to change was a factor in their disinterest in integrating technology. According to this study's findings, some educators might have been reluctant to adapt since they felt more at ease carrying out tasks the old-fashioned way.

It is possible that teachers felt compelled to teach outside of their areas of expertise since they were so used to traditional teaching techniques, especially during the Covid 19 period. Despite the widespread availability of technology in the classroom, research indicates that many educators remain reluctant to fully integrate it (Holland, 2015). Because they think incorporating technology will add to their total burden, educators may occasionally feel nervous about doing so (Omar & Ismail, 2020). In addition, there is a possibility that some educators are reluctant to embrace technology because they do not know enough about it or are unsure of its value in improving student results (Schindler et al., 2017). Principals of schools ought to be able to convince teachers of the many benefits that integrating technology into the classroom may offer. Furthermore, providing sufficient training in effective ICT integration techniques may help educators feel less uncomfortable with technology.

CONCLUSION

The purpose of this study was to investigate the leadership strategies used by principals of public secondary schools in integrating technology for efficient curriculum delivery within and post Covid 19. It also covered some of these strategies' benefits, as well as drawbacks. New administrative, communication, instructional, and resource acquisition activities, as well as training for responsive professional growth emerged as three themes in leadership. Together with challenges such as internet connections and insufficient ICT resources, a number of successes were noted, including enhanced communication and a decrease in paper usage. Thus, pre-service and in-service training for principals and teachers, as well as the development of an updated technology use policy are among the recommendations. The study might also have an impact on how creative technology policies that address the particular needs of our contemporary society are developed in Antigua and other developing countries in the region. Further studies may concentrate on leadership strategies in private secondary schools setting.

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Investigation of Smartphone Addiction of Middle School and High School Students[1]

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ABSTRACT
Addiction is the state of being addicted to any activity, substance, object or behavior in a way that excludes other activities of one's life or causes physical, mental or social harm to oneself and others. In addition to many and various types of addiction, it seems that an important type of addiction is technology addiction. Today, the dizzying development of technological developments and their inclusion in every aspect of our lives has made it necessary for us to rethink the concepts of far and near. With the rapid development in mobile phone technology, the standard mobile phones used in the past to call someone or send a message to someone have been replaced by state-of-the-art smartphones that make our daily lives much easier. However, on the other hand, it is seen that addiction to smartphones, which have become an integral part of life, is on the rise, and this goes back to pre-school periods. In this context, the aim of the research was determined to examine whether the smartphone usage level of students studying in secondary and high schools affiliated to the National Education Directorate of Tunceli province Hozat district in the 2022-2023 academic year varies significantly according to some demographic characteristics of the students. Within the scope of quantitative research, the data of the research designed in the general survey model were collected by applying the "Smartphone Addiction Scale Short Form (ATBÖ-SF)", developed by Kwon et al. and adapted to Turkish by Noyan et al., face to face between May and June 2023. The scale, for which validity and reliability studies were conducted, was found to be suitable for the use of parametric tests, and in addition to test analyzes such as frequency, percentage, arithmetic mean, T Test and One-Way Variance Analysis were used to determine the significance of the difference using statistical data analysis techniques. As a result of the analysis, the average smartphone addiction level being below 3 was interpreted as the students not having smartphone addiction, but the measurements being just below the average indicating a risk factor, while the difference between the dependent and independent variables was not significant ($p<.005$). According to the research findings, the smartphone addiction level of students at the lower limit of addiction carries a risk factor, in this respect the findings are warning, and it is recommended that parents, society, and especially schools and relevant institutions and organizations take precautions against the apparent danger.
Keywords: Smartphone, student, education, addiction, technology

INTRODUCTION

In today's world, where progress in science and technology has reached incredible dimensions, social life is also seen to be keeping pace with this rapid change and transformation, much like the interconnected pieces of a puzzle. The dizzying pace of technological developments, and their inclusion in every aspect of our lives, has prompted a reevaluation of the concepts of distance and proximity (Gürkan et al., 2022). With the rapid advancements in mobile phone technology, the standard mobile phones, which were once used solely for calling or texting, have been replaced by state-of-the-art smartphones that greatly simplify daily life. Nowadays, tasks and processes that

[1] This article is derived from the master's thesis titled "Investigation of Smartphone Addiction Among Students: A District School Case Study," conducted in the Department of Political Science and Public Administration at Munzur University Institute of Graduate Education.

could only be performed with computers in the past can be easily carried out with smartphones (Çakır & Oğuz, 2017).

Smartphones offer numerous activities that simplify human life and have positive effects, such as easy access to desired data, data sharing, enhanced communication opportunities, listening to music, taking photos, using social media, making friends, playing online and offline games, accelerating banking transactions, and online shopping from websites (Şimşek & Zabun, 2019). However, alongside the expected conveniences that smartphones bring, especially as they are used for an increasing variety of purposes, a significant impact of their use manifests in the form of addiction. Research findings show that smartphones, which have found widespread use not only among different age groups but also among middle and high school students, have addictive effects. This has drawn attention to individuals at this educational level. In this context, the main theme of this study is to examine the level of smartphone addiction among students in the pre-university education stage.

PROBLEM STATEMENT

Communication is the state in which living beings, especially humans, interact with each other by using visual and auditory symbols to convey their emotions, knowledge, and ideas. In other words, communication is the transmission of information, ideas, attitudes, or feelings from one person or group to another (or others) via symbols, as described by Bülbül (as cited in Çakır & Topçu, 2005, p.2). It is the process of assigning meaning to the message through the exchange of information between a source and a receiver via a channel. Communication, which was quite limited in ancient times, has reached a mass scale and an incredible speed due to advancements in science, technology, and technical tools. For example, communication, which in prehistoric times was carried out using a single method like smoke signals, reached its second method, cuneiform writing, around 3100–2500 BCE. Subsequently, in the 1st and 2nd centuries, it evolved to the use of courier letters, and by 2900–3500 BCE, pigeons were used for postal services. In the 17th century, communication witnessed tremendous development. Newspapers, which delivered daily information to the masses, came into play, significantly increasing both the scope and speed of communication, as well as the number of individuals engaged in the process.

Initially, books were a communication tool limited to a very small, elite group compared to newspapers. By 1784, postal carriages began to be included as carriers of information, news, etc. The invention and use of the telegraph between 1791-95 weakened the influence of postal carriages in the communication world while leading to another development. In the 1830s-40s, postage stamps were introduced into postal services. The laying of transcontinental cables became possible in the 1850s-60s, bringing communication to a transcontinental level (Barbier, 2001; Güneş, 2013:290). The telephone, invented in the 1870s, drastically shortened the time between the invention of the second, third, and fourth communication tools, serving as a harbinger of further developments. This new development became even more effective with the inclusion of radio in the process in the early 1900s, removing all barriers to the advancement of communication and communication tools.

By the 1920s, airmail was introduced, and in the 1960s, communication satellites were launched, allowing live broadcasts to be delivered to people through television. The early 20th century saw the introduction of the internet (with email enabling instant communication), and by the beginning of the 21st century, mobile communication and mobile phones (or smartphones) became part of mass use (Güneş, 2013:294). This led to an unprecedented speed and continuity in communication, bringing people from all over the world closer together and perfectly completing a crucial leg of globalization. In other words, while globalization was completed on the economic level, it was also achieved in terms of communication. However, the problem here is that the accessibility of communication tools, which was once insufficient for people, has now increased to the point where it has reached the level of addiction through mobile phones (Aydoğan, 2013; Baldini, 2000; Barbier, 2001; Toplu, 2008; Aymaz, 2018; Uslu, 2021).

Over the past fifteen years, the use of mobile devices during childhood has significantly increased in many countries (Rideout, Saphir, Pai, & Rudd, 2013). A recent study in the UK found that children now spend more time online than watching TV, with tablets and smartphones being the devices most frequently used by children to access the internet (Ofcom, 2016). Similar studies conducted in other countries suggest that more Asian children and adolescents are developing smartphone addiction (Çelik, 2020; Çelik & Ulusoy, 2019; Ektiricioglu et al., 2020; TÜİK, 2022), with a growing trend towards younger ages and an increasing rate of smartphone addiction among individuals in pre-university education. Given this situation, it becomes crucial to examine the causes and consequences of smartphone addiction across all educational levels nationwide, as well as to analyze it based on some demographic characteristics of students. This would help gather reliable data, which could assist decision-makers in taking timely and meaningful actions to mitigate potential negative impacts on children and adolescents.

Research Purpose

The aim of this study is to examine the smartphone addiction levels of middle and high school students based on certain demographic characteristics and to develop recommendations in light of the findings. To achieve this, the following research questions were addressed:

1. What is the level of smartphone addiction among students?
2. Do students' smartphone addiction scale scores show a significant difference based on gender?
3. Do students' smartphone addiction scale scores show a significant difference based on school level?
4. Do students' smartphone addiction scale scores show a significant difference based on their parents' income levels?
5. Do students' smartphone addiction scale scores show a significant difference based on their parents' educational levels?
6. Do students' smartphone addiction scale scores show a significant difference based on their parents' occupations?

METHOD

This section provides information on the research model, the population and sample, data collection methods, data collection tools, and data analysis.

Research Model

This research was designed using the general survey model within the scope of quantitative research. The most fundamental principle of quantitative research is to express the findings in numerical terms, making them measurable, and to base the research on hypotheses, testing these hypotheses (Ekiz, 2003, p.93). Survey studies, which are widely used in social sciences and allow for large-scale analysis, typically describe the existing performance, views, thoughts, and attitudes of the target group, such as gender, age, and socioeconomic status, either individually or in relation to some factors (Büyüköztürk, 2014, p.2; Gurbetoğlu, 2018). According to Christensen and colleagues (2015, p.368), survey research aims to reveal changes over time or uncover the underlying aspects of a particular situation.

Population and Sample

The population of the study consists of a total of 232 students enrolled in middle and high schools affiliated with the Hozat District Directorate of National Education in Tunceli during the 2022-2023 academic year. Among these students, 118 are in middle school and 114 are in high school (Table 1). Since it was possible to reach the entire population, no sampling method was used.

Table 1. Data of Middle and High Schools from the Hozat District Directorate of National Education for the 2023-2024 Academic Year

School Type	Number of Students	Number of teachers	Number of students
Ercan Doğan Middle School	118	19	118
Zübeyde Hanım High School	114	11	114
Total	232	30	232

Despite the response rate of the administered scale being 82%, the number of scales that could be subjected to statistical analysis remained at 144. This represents 62% of the total participants. Accordingly, the personal characteristics of the 144 participants are presented in Tables 3.2, 3.3, 3.4, and 3.5.

Table 2. Percentage and Frequency Distribution of the Personal Characteristics of Participants (N=144)

Variables	Characteristics	Frequency (f)	Percentage (%)
Gender	Female	73	50.7%
	Male	71	49.3%
School Type	Middle School	62	43.1%
	High School	82	56.9%
Father's Occupation	Not Working	33	22.9%
	Worker	77	53.5%
	Civil Servant	25	17.4%
	Retired	9	6.3%
Mother's Occupation	Not Working	109	75.7%
	Worker	20	13.9%

	Civil Servant	15	10.4%
	Other	23	16.0%
Family Income Level	Medium	101	70.1%
	High	16	11.1%
	Very High	4	2.8%

Table 2 presents the percentage and frequency distribution of certain personal characteristics of the participants. As shown in the table, 50.7% of the participants are female, while 49.3% are male. Among them, 43.1% are middle school students, and 56.9% are high school students. When examining the occupations of their fathers, it can be noted that 22.9% of the fathers are not working, 53.5% are workers, 17.4% are civil servants, and 6.3% are retired. In terms of mothers' occupations, 75.7% of the mothers of the participating students are not working and are homemakers. Meanwhile, 13.9% are workers, and 10.4% are civil servants. According to the perceptions of income levels in Turkey, 16.0% of the participants perceive their families as having low income, 70.1% as having medium income, 11.1% as having high income, and 2.8% as having very high income.

The information regarding the responses to other questions included in the personal information form of the participants is provided below.

This includes the daily smartphone usage duration of the participants, the smartphone brands they use, and the level of impact smartphone usage has on their lives.
The percentage and frequency distribution regarding the daily smartphone usage duration, the smartphone brands used, and the level of impact on their lives is presented in Table 3.

Table 3. Percentage and Frequency Distribution of Participants' Daily Smartphone Usage Duration, Smartphone Brand, and Impact Level on Their Lives

Variables	Characteristics	N	%
Daily Usage Duration	0-2 Hours	60	41.7
	2-4 Hours	52	36.1
	4-6 Hours	22	15.3
	6-8 Hours	8	5.6
	8 Hours and Above	2	1.4
Smartphone Brand	Apple	34	23.6
	Samsung	58	40.3
	Huawei	14	9.7
	Other	38	26.4
Impact of Smartphone on Life	Not at all	23	16.0
	Very little	39	27.1
	Partially	53	36.8
	It affects	23	16.0
	It affects a lot	6	4.2
Do You Think You Are Addicted?	Yes	16	11.1
	No	78	54.2
	Partially	44	30.6
	No opinion	6	4.2

Table 3 shows the distribution of participants' daily smartphone usage time, the brands of smartphones they use, the extent to which smartphone usage affects their lives, and their opinions on whether they consider themselves smartphone addicts. According to Table 3, it can be seen that the participants use their smartphones for the most part between 0-2 hours a day, which accounts for 41% of the group. The second most common usage time is between 2-4 hours, with 36.1%. In third place, 15.3% use their smartphones for 4-6 hours a day, while 5.6% use them for 6-8 hours, and only 1.4% use them for 8 hours or more a day.

When asked about the brand of smartphone they use, the participants indicated that the highest percentage, 40.3%, use Samsung smartphones. Additionally, 26.4% reported using smartphones other than Apple, Samsung, and Huawei, while 23.6% use Apple and 9.7% use Huawei smartphones.

In response to the question of how much smartphones affect their lives, 36.8% of participants stated that smartphones affect them to some extent, 27.1% indicated that they affect them very little, 16.0% said they do not affect them at all, and 4.2% claimed that smartphones affect them very much.

Regarding whether the participants consider themselves smartphone addicts, 54.2% stated that they are not addicted, 30.6% said they are somewhat addicted, 11.1% said yes, they are addicted, and 4.2% did not express any opinion.

Participants' Purpose of Smartphone Usage
The percentage and frequency distribution of the participants' purpose of smartphone usage is presented in Table 4.

Table 4. Percentage and frequency distribution of smartphone usage purposes

Variables		N	%
Purpose of Smartphone Usage	Social Networks	83	57.6
	Talking	50	34.7
	Browsing the Internet	48	33.3
	SMS	105	72.9
	Educational Applications	51	35.4
	Checking Social Networks	54	37.5
	Playing Games	61	42.4
	Listening to Music	38	26.4
	Making Calls	51	35.4
	Checking Emails, Correspondence	123	85.4
	Text Messaging	109	75.7
	Watching TV/Movies	57	39.6
	Reading Books	108	75.0
	Taking Photos	55	38.2
	Checking News	93	64.6
	Others (if any)	130	90.3

Table 4 shows the percentage and frequency distribution of the purposes of smartphone usage. According to the examination of Table 4, it can be observed that students indicated they use smartphones primarily for listening to music, at a rate of **73.6%**. Additionally, **66.7%** reported using them for browsing the internet and **65.3%** for communication. The lowest usage purposes were found to be checking emails at **14.6%** and text messaging at **24.3%**. Information about the sample group is provided in the tables below.

The Most Used Type of Social Media Among Smartphone Users
The percentage and frequency distribution of the most used types of social media on smartphones is shown in Table 5.

Table 5. Percentage and frequency distribution of the most used social media on smartphones.

Variable	Feature	N	%
The Most Used Social Media on Smartphones	Instagram	74	51.4
	WhatsApp	79	54.9
	Twitter	19	13.2
	Facebook	13	9.0
	YouTube	83	57.6
	Other (if any)	16	11.1

Table 5 shows the percentage and frequency distribution of the social media tools most used by students on their smartphones. According to the table, YouTube ranks first with 57.6%, followed by WhatsApp in second place with 54.9%, and Instagram in third place with 51.4%. Twitter comes in fourth with 13.2%, while other social media networks rank fifth with 11.1%. Finally, Facebook is the least used, with 9.0%.

Data Collection
The data for this research was collected using the Short Form of the Smartphone Addiction Scale (ATBÖ-KF) in addition to a personal information form. The necessary permissions for the application of the scale were obtained

based on the researcher's application dated 02/03/2023 with reference number 7377, according to the decision numbered 2023/06-06 of the Munzur University Non-Invasive Research Ethics Committee.

Information about the Short Form of the Smartphone Addiction Scale (ATBÖ-KF)

The long form of the smartphone addiction scale developed by Kwon et al. (2013) consists of 33 questions, while the short form designed for adolescents (the transition period from childhood to adulthood) contains 10 questions. The short form was adapted into Turkish by Noyan et al. (2015) and its validity and reliability were tested among university students. It was shown to have a single-factor structure, and its sub-scales have not been defined. The calculated Cronbach alpha value is reported to be 0.867, indicating that it is valid and reliable for assessing smartphone addiction in young adults. The scale, consisting of 10 questions, is rated on a scale from 1 to 6. The ratings are as follows: 1 – Strongly disagree, 2 – Disagree, 3 – Slightly disagree, 4 – Slightly agree, 5 – Agree, 6 – Strongly agree. The scale demonstrates a one-factor structure, and scores range from 10 to 60. As the score obtained from the scale increases, the risk of smartphone addiction also increases. According to a standardization study, if a student's total score from the scale is below 29.50, they are not considered a smartphone addict, while a score above 29.50 indicates smartphone addiction.

Validity and Reliability Analyses of the Short Form of the Smartphone Addiction Scale (ATBÖ-KF) Used in the Research.

Reliability Analysis of the Short Form of the Smartphone Addiction Scale (ATBÖ-KF)

The reliability of the scales used in the research indicates how accurately the scales measure the behaviors we aim to assess in the participants (Kurtuluş, 2006:374). In measuring the reliability of the questions in the questionnaire evaluated in this study, the Alpha Value (Cronbach Alpha) and item-total correlation values were used. According to some researchers (Büyüköztürk, 2004, 165), an alpha coefficient greater than 0.70 indicates a high reliability scale, while others (Kalaycı et al., 2006, 403) suggest that a value of 0.60 and above in social sciences also indicates a scale of high reliability.

Table 6. Alpha coefficient values of the Short Form of the Smartphone Addiction Scale (ATBÖ-KF)

	Scale Mean (when the item is removed)	**Scale Mean** (when the item is removed)	**Scale Mean** (when the item is removed)	**Scale Mean** (when the item is removed)
S 1	23,02	101,265	,639	,891
S 2	23,25	100,399	,655	,890
S 3	22,92	99,679	,646	,891
S 4	22,63	95,143	,701	,887
S 5	23,06	96,458	,731	,885
S 6	23,17	101,263	,607	,893
S 7	23,11	99,680	,670	,889
S 8	23,42	103,085	,547	,897
S 9	22,72	96,079	,710	,886
S 10	22,63	98,290	,607	,894
N= 144 (α) = 0.900 Number of Variable = 10				

Internal Consistency and Reliability of the "Smartphone Addiction Scale-Short Form" (SAS-SF)

The internal consistency and reliability of the 10-item "Smartphone Addiction Scale-Short Form" (SAS-SF) were first assessed by looking at the alpha coefficient values. Previous research has reported the Cronbach's alpha coefficient for the SAS-SF as 0.90. For this study, the α value of the scale was calculated to be 0.900. According to the obtained alpha (α - Cronbach's Alpha) coefficient, the scale has a very high reliability (Table 6).

To test the reliability of the scale, in addition to the alpha value, the total score correlation values of the scale were also examined (Şencan, 2005, 257-62; Büyüköztürk, 2004, 165). This value should be greater than 0.30. As seen in Table 6, no value below 0.54 is observed. Therefore, according to the item-total score correlation values, the questionnaire is reliable.

Validity Analysis of the Smartphone Addiction Scale-Short Form (SAS-SF)

The long form of the smartphone addiction scale developed by Kwon et al. (2013) consists of 33 questions, while the short form developed for adolescents (the transitional period from childhood to adulthood) consists of 10 questions. The short form has been adapted into Turkish by Noyan et al. (2015) in Turkey, and its validity and reliability have been studied among university students. It has been shown to have a single-factor structure, and

no subscale has been defined. The calculated Cronbach alpha value is reported as 0.867, indicating that it is valid and reliable for assessing smartphone addiction in young adults. The scale, consisting of 10 questions, is scored on a scale from 1 to 6. The scoring is as follows: 1 - Strongly Disagree, 2 - Disagree, 3 - Somewhat Disagree, 4 - Somewhat Agree, 6 - Strongly Agree. In the interpretation of the findings, as the score obtained from the scale increases, the risk of smartphone addiction also increases; according to the standard-setting study conducted, if a student's total score from the scale is below 29.50, they are not considered a smartphone addict, while a score above 29.50 indicates smartphone addiction. In other words, the cutoff score of the scale has been obtained as 29.50, regardless of gender. Participants scoring below this value are not assessed as smartphone addicts, while those with higher scores are considered to be smartphone addicts.

Factor Analysis for the Scale's Validity

Factor analysis was conducted to assess the validity of the scale. To determine whether the data collected from respondents are suitable for factor analysis, KMO (Kaiser-Meyer-Olkin) and Bartlett tests were applied. The KMO value should be above 0.5, and the Bartlett test should yield significant results (Kalaycı et al., 2006:321-322). Additionally, it is preferred that the factor loadings for the items found through factor analysis be 0.40 or higher (Büyüköztürk, 2004).

As a result of the factor analysis, the Kaiser-Meyer-Olkin (KMO) value for the Smartphone Addiction Scale-Short Form (SAS-SF) was found to be 0.910. A KMO value above 0.50 indicates that the scale is suitable for factor analysis (Büyüköztürk, 2004).

Secondly, the Bartlett test values were examined regarding the factor analysis. The significance value of the "Smartphone Addiction Scale" question list was found to be significant ($p = 0.000<0.01$; $\chi^2=658.252$). Furthermore, the 10 statements included in the smartphone addiction scale explain 52.950% of the total variance, indicating that it is unifactorial.

Analysis of the Data

For the analysis of the data, statistical test techniques were applied, and the normal distribution was checked using Skewness and Kurtosis values, both of which were found to be between -1.00 and +1.00. Considering that the Skewness (.683) and Kurtosis (-.109) values are referenced for normal distribution of scale scores in social sciences, it can be concluded that the scale scores of the "Smartphone Addiction Scale-Short Form" demonstrate normal distribution.

FINDINGS

In this section of the study, the findings related to the research problem and sub-problems are presented.

What is the level of smartphone addiction among students?

The first sub-problem of the research is stated as "What is the level of smartphone addiction among students?" The total scores, mean, and standard deviation values obtained from the scale are presented in Table 7.

Table 7. Students' Participation Levels in the Smartphone Addiction Scale

Measure	Min.	Max.	Mean Participation Level ($\bar{x}$)	Standard Deviation
Smartphone Addiction	10	55	25.54	1.1

Participants' Responses to the Smartphone Addiction Scale

Participants demonstrated a mean participation level of $\bar{X} = 25.54$ in the "Smartphone Addiction" scale, indicating a near-moderate level of engagement. In other words, since the students' smartphone addiction levels remained below $\bar{X} = 29.50$, it can be interpreted that they are not considered smartphone addicts.

The levels of agreement regarding the statements included in the scale are presented in Table 8.

Table 8.: Levels of Agreement

Scale	Statements	Average Participation Level ($\bar{x}$)	Standard Deviation
Smartphone Addiction	1. I cannot keep up with the tasks I planned because of smartphone use.	25.3	1.38
	2. I have difficulty concentrating while doing assignments or listening to lessons in class due to smartphone use.	23.0	1.42
	3. I feel pain in my wrists or neck when using my smartphone.	26.3	1.48
	4. I cannot live without my smartphone.	29.2	1.68

	5. I feel impatient and irritable when I do not have my smartphone in my hand.	2.49	1.54
	6. Even if I don't use it, my smartphone is always on my mind.	23.8	1.44
	7. Even if my daily life is greatly affected, I will never stop using my smartphone.	24.4	1.44
	8. I constantly check my smartphone to avoid missing conversations among other people on Twitter or Facebook.	21.2	1.43
	9. I use my smartphone for longer than I think.	28.3	1.60
	10. People around me say that I use my smartphone too much.	29.2	1.66

Table 8: When examining the levels of participation in the smartphone addiction scale, the highest participation was observed for the statements "People around me say that I use my smartphone too much" (M: 29.2) and "I can't live without my smartphone" (M: 29.2). Additionally, high levels of participation were noted in the statements "I use my smartphone longer than I think" (M: 28.3), "I feel pain in my wrists or neck when using my smartphone" (M: 26.3), and "I can't complete my planned tasks because of smartphone use" (M: 25.3). According to the calculations made for all statements, the addiction score is below M = 29.50; therefore, they appear to have a lower level of addiction. However, it should be noted that the level of smartphone addiction is close to the midpoint, suggesting that there may be a risk of addiction.

Do the smartphone addiction scale scores of students show a significant difference based on gender? Findings related to the sub-problem statement:

The second sub-problem statement of the study is expressed as "Do the smartphone addiction scale scores of students show a significant difference based on gender?" The total scores, means, and standard deviation values obtained from the scale are presented in Table 9.

Table 9: Smartphone addiction scores of students based on gender - Test results

				Levene Test		t Test		
Scale	n	x̄	ss	F	p	sd	t	p
Smartphone addiction								
Famale	73	25,12	10,73	,986	,322	142	-,469	,640
Male	71	25,98	11,32					

*Independent Samples t-Test, *<0,05, **<0,01*

To determine whether there is a significant difference in the perceptions of "Smartphone Addiction" based on the gender of the participants, the results of an independent samples t-test indicated that no statistically significant difference was found in students' perceptions of smartphone addiction according to their gender (t: -0.469; p: 0.640 > 0.05). This finding can be interpreted as indicating that there is no significant relationship between smartphone addiction and gender.

Do students' smartphone addiction scale scores show a significant difference according to school levels? Findings related to the sub-objective sentence.

The third sub-objective problem statement of the research is expressed as “Do students' smartphone addiction scale scores show a significant difference according to school levels?” The total score, mean, and standard deviation values obtained from the scale are presented in Table 10.

Table 10. Differences in students' smartphone addiction based on school types

				Levene Test		t Test		
Scale	n	x̄	ss	F	p	sd	t	p
Smartphone addiction								
Secondary School	62	22,67	10,00	4,410	,038	142	-2,787	,006**
High School	82	27,71	11,28					

*IndependentSamples t-Test, *<0,05, **<0,01*

To determine whether there is a significant difference in the perceptions of "Smartphone Addiction" based on the type of school variable among the participants, the results of an independent samples t-test showed that a statistically significant difference was found in students' perceptions of smartphone addiction according to their

school types (t: -2.787; p: 0.006 < 0.01). Accordingly, students studying at the high school level have higher levels of smartphone addiction (M: 27.71) compared to those studying at the middle school level (M: 22.67).
Findings Related to the Sub-objective Sentence on the Differences in Smartphone Addiction Based on Class Levels
The fourth sub-objective problem statement of the research is expressed as “Do students' smartphone addiction scale scores show a significant difference according to class levels?” The total score, mean, and standard deviation values obtained from the scale are presented in Table 11.

Table 11. One-way ANOVA results of students' smartphone addiction based on class levels

Dimensions	n	x̄	Stand Dev	Variance.	Total Squares	sd	Mean Squares	F	p	LSD
Smartphone Addiction										
1. 1.st class	26	26,23	10,15	Between Groups	1107,494	3	369,165	3,190	,026*	2-1
2. 2nd. class	32	20,43	8,65	Within gr.	16202,166	140	115,730			2-3
3. 3rd.class	49	27,57	11,81	Total	17309,660	143				2-4
4. 4th. class	37	26,81	11,30							
Total	144	25,54	11,00							

*One Way ANOVA, *<0,05, **<0,01*

To determine whether there is a significant difference in the perceptions of "Smartphone Addiction" based on the class level variable among the participants, the results of the one-way ANOVA analysis indicated that a statistically significant difference was found in students' perceptions of smartphone addiction according to their class levels (F: 3.190; p: 0.026 < 0.05). The difference found is significant in favor of 2nd-grade students. Accordingly, the smartphone addiction levels of 2nd-grade students were found to be lower than those of students in other grades.
Findings Related to the Sub-objective Sentence on Differences in Smartphone Addiction Scale Scores According to Parents' Income Levels.

The fifth sub-problem of the research is expressed as “Do students' smartphone addiction scale scores show a significant difference according to their parents' income levels?” The total score, mean, and standard deviation values obtained from the scale are presented in Table 12.

Table 12. One-way ANOVA results of students' smartphone addiction based on family income levels

Dimensions	n	x̄	Stand Dev	Variance.	Total Squares	sd	Mean Squares	F	p	LSD
Smartphone Addiction										
1. None	23	29,21	11,02	Between Groups	675,901	3	225,300	1,896	,133	
2. Moderata	101	24,60	11,21	Within gr.	16633,759	140	118,813			
3 Very much	16	27,93	9,08	Total	17309,660	143				
4. Quite a lot	4	18,75	6,80							
Total	144	25,54	11,00							

*One Way ANOVA, *<0,05, **<0,01*

To determine whether there is a significant difference in the perceptions of "Smartphone Addiction" based on the family income levels of the participants, the results of the one-way ANOVA analysis indicated that no statistically significant difference was found in students' perceptions of smartphone addiction according to their family income levels (F: 1.896; p: 0.133 > 0.05).

Findings Related to the Sub-objective Sentence on the Significant Differences in Smartphone Addiction Scale Scores According to Parents' Occupations.

The sixth sub-problem of the research is expressed as “Do students' smartphone addiction scale scores show a significant difference according to their parents' occupations?” The total score, mean, and standard deviation values obtained from the scale for fathers' occupations are presented in Table 13.

Table 13. One-way ANOVA results of students' smartphone addiction based on fathers' occupations

Dimensions	n	x̄	Stand Dev	Variance.	Total Squares	sd	Mean Squares	F	p	LSD
Smartphone Addiction										
Unemployed	33	28,48	10,57		432,533	3	144,178	1,196	,314	

Worker	77	24,89	11,21	Between Groups	16877,127	140	120,551
Civil Servant	25	23,44	10,88	Within gr.	17309,660	143	
Retired	9	26,22	10,59	Total			
Total	144	25,54	11,00				

*One Way ANOVA, *<0,05, **<0,01*

To determine whether there is a significant difference in the perceptions of "Smartphone Addiction" based on the occupations of the fathers of the participants, the results of the one-way ANOVA analysis indicated that no statistically significant difference was found in students' perceptions of smartphone addiction according to their fathers' occupations (F: 1.196; p: 0.314 > 0.05).

Findings Related to the Sub-objective Sentence on the Differences in Students' Smartphone Addiction According to Their Mothers' Occupations.

The seventh sub-problem of the research is expressed as “Do students' smartphone addiction scale scores show a significant difference according to their parents' education levels?” The total score, mean, and standard deviation values obtained from the scale for mothers' occupations are presented in Table 14.

Table 14. One-way ANOVA results of students' smartphone addiction based on mothers' occupations

Dimensions	n	x̄	Stand Dev	Variance.	Total Squares	sd	Mean Squares	F	p	LSD
Smartphone Addiction										
1. Not working	109	25,85	10,85	Between Groups	192,808	2	96,404	,794	,454	
2. Worker	20	22,80	9,49	Within gr.	17116,851	141	121,396			
3. Officer	15	27,00	13,85	Total	17309,660	143				
Total	144	25,54	11,00							

*One Way ANOVA, *<0,05, **<0,01*

According to the results, no statistically significant difference was found in the perception of smartphone addiction among students based on their mothers' occupations (F: 0.794; p: 0.454 > 0.05).

Conclusion

In the literature, addiction was previously understood as substance addiction, but recently, its scope has expanded, and research is now focusing on a new type of addiction (Yılmaz et al., 2020). This type of addiction, expressed as behavioral addictions unrelated to substances, involves "repetitive impulses to behave harmfully" (Marks, 1990), and despite the harm it causes to one's life, it is characterized by an uncontrollable desire to exhibit certain behaviors and engage in repeated pleasure-inducing behavioral patterns (Black, 2013; Mann et al., 2017). This addiction manifests itself not in dependence on a substance but in the addiction to a behavior or the feelings experienced when the behavior is performed (Alavi et al., 2011). On the other hand, behavioral addiction also involves excessive behavior accompanied by core addiction symptoms such as tolerance, withdrawal, loss of control, craving, cognitive salience, and mood regulation (Kwon et al., 2013).

This type of addiction is essentially digital addiction, encompassing smartphone addiction, internet addiction, screen addiction, social media addiction, digital game addiction, and an intense desire for various digital media tools (Dilci et al., 2019). People's addictions to technology are being investigated under the titles of internet addiction, technological addiction, computer addiction, virtual game addiction, Facebook addiction, digital game addiction, social media addiction, and importantly, smartphone addiction. In this context, the present research examined the relationship between smartphone addiction and certain demographic variables among adolescents in middle and high school. The World Health Organization (WHO) defines adolescence as the period between 10-19 years, youth as the period between 15-24 years, and those aged 10-24 as young people, while considering these age groups within adolescent health (WHO, 2020). Accordingly, individuals in middle and high school can be considered adolescents.

The data for this research, designed within the general survey model as part of a quantitative study, were collected through the Smartphone Addiction Short Form (SAS-SF). Since the scale scores were normally distributed, parametric test techniques were used to analyze the data. The findings revealed that the level of smartphone addiction among middle and high school students in the central district schools of Hozat was slightly below the level posing a risk ($\bar{X}$=2.59). One of the similar findings in the literature was made by Akyürek (2020) on high

school students. According to this research, although the average score was slightly below the midpoint ($\bar{X}$=2.44), it was still considered significant enough to conclude that high school students were addicted to smartphones. It can be said that the findings of this research align with those of similar studies in the literature. For instance, Mazılı and Gültekmin (2020) found that the majority of adolescents had a level of addiction slightly below the risk threshold. Similarly, Aljomaa, Qudah, Albursan, Bakhiet, and Abduljabbar (2016) reported similar findings in their study on high school students. A study by Çalışkan, Yalçın, Aydın, and Ayık (2017) also found that prospective teachers had a smartphone addiction level close to moderate. In Bağcı's (2018) research, it was found that the students participating in the study had moderate levels of smartphone addiction. A study by Sırakaya (2018) found that associate degree students' smartphone use was at a moderate level. Durak and Seferoğlu (2018) aimed to examine the smartphone usage and addiction levels of 5th and 6th-grade middle school students based on certain demographic variables. According to the results, most students used smartphones mainly for gaming, and more than half of the students were classified as "addicted." Çakır and Oğuz's (2017) study involved 540 high school students. The results revealed that high school students had moderate levels of smartphone addiction and loneliness. Similarly, research by Chen, Liu, Ding, Ying, Wang, and Wen (2017) on smartphone addiction among medical students found that the smartphone addiction rate was 29.3% for women and 30.3% for men, with an overall rate of 29.3%. According to Kwon et al. (2013), students exhibited high levels of smartphone addiction. In a study by Haug, Castro, Kwon, Filler, Kowatsch, and Schaub (2015), 16.9% (256) of students were found to be smartphone addicts. The study by Kahyaoğlu Süt, Kurt, Uzal, and Özdilek (2016) found that university students used their smartphones at high rates, while Mert and Özdemir's (2018) research found that the average smartphone usage rate among participants was above average ($\bar{X}$=3.19).

These findings indicate that secondary school students are at a borderline risk of smartphone addiction, and if preventive measures are not taken, it is inevitable that they will exceed the risk threshold and reach a level of behavioral addiction. This, in turn, is likely to lead to undesirable situations and events reflected in society due to the negative impact on the individual's life.

In conclusion, considering the fact that individuals and society cannot remove digital tools from their lives and instead must use them as a significant necessity, solutions must be developed. These solutions should be implemented at the international and national levels, involving all levels of society, including families, parents, schools, teachers, civil society organizations, and especially the media, which should be equipped with the necessary knowledge and resources on this matter.

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Measurement of Punch Velocity and Strength in Elite Kickboxers with the Help of Sensor Competition Simulation

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ABSTRACT
This research aimed to measure the fist speed and strength of Elite Kick Boxers from TRNC and the Republic of Turkey, which are the basic techniques of hand smacking. Since measuring with scientific precision technological devices is not suitable due to the dress code in the competitions, punch counts, speeds and strengths were measured by re-creating a similar environment simulation to the competition conditions and wrapping the bandages on the hands through high-precision Corner Boxing Technology sensors under the hand bandages.

The number and speed of direct punches hit by the athletes in the competitions increased compared to other punch types, and then the number and speed of crochet punches also increased. This research has not been done in the TRNC and Turkey before, and it is an authentic study. The results of this research will contribute to both the TRNC and the Turkish national teams in terms of the re-establishment of the training and competition strategies.
Keywords: Kickbox, direct punch, crochet punch, uppercut, striking velocity, striking strength.

1. INTRODUCTION

Sports impact people directly in terms of their physical, psychological, and social development. Especially athletes in close contact sports must explore and acknowledge their skills and what they can achieve and discover themselves before getting to know their opponents.

In martial arts, traditionally, the importance of self-knowledge, self-development and self-control is emphasised. Kickboxing, besides self-defence, is also practising philosophical and moral values that can be put into actual life practice.

There is an intense interest in Far Eastern martial arts globally. In recent years, the professional practice of boxing, kickboxing, and muay Thai, which started professionally in TRNC and the Republic of Turkey as well, has increased the interest in all branches that can be regarded as martial arts all over the world. Although this increasing interest in martial arts positively affects scientific research studies, such studies are very limited in TRNC.

Generally, martial arts are sports branches that aim to develop the skills and characteristics of an athlete in a disciplined way, as well as self-defence. Kickboxing, which is one of these sports branches, is one of the most modern and popular branches of our time. Kickboxing is a type of martial arts, which aims to apply a powerful contact to the counter competitor a by using a punch, kick and tibia as kicking techniques. Kickboxing is known as suitable for all ages nowadays. If monitoring kickboxing is increased, this will positively affect the potential outlook of this sport.

In marital arts, a single performance characteristic of an athlete is not sufficient. In marital arts; power, strength, speed, durability and technique should be consecutive for success. Elite athletes must have a high-performance muscle power and strength to be able to use technique-tactics abilities at competitions. Punching is the main movement of kickboxing and individuals must have speed and power to punch effectively. It is also important that athletes who compete with kickboxers extremity muscle power for their performance. For this reason, all the punching techniques must be applied powerfully, fast and continue to continuity.

1.1 The Aim of the Research

The aim of this research is;
to measure the number of punches, speeds and punch forces in Elite Kick Boxers' hand kicks, which is one of the basic techniques in the competitions. The objective is to sensitively measure their strokes with technological devices and scientific precision by creating a simulation environment similar to the competition conditions. The results will contribute to the redefinition and development of the training and competition strategies of the athletes.

1.2 The Importance of the Research

In line with the data obtained from such a scientific study conducted for the first time on martial arts, it is vital for competitive athletes to see the performance of their ineffective or effective punches that they did not notice during the competition. Moreover, it is important to see the factors that cause them to win or lose the competition from a scientific point of view so that they can continue their strategies and training programmes in this direction. After all these studies, the answers to the questions of which technical-tactical or motor skills are missing or how it has achieved the highest performance efficiency can be found.

1.3 Hypothesis

H0: In Elite Kick Boxers' competition simulation, punch speed and punch strength do not differ between rounds.
H1: In Elite Kick Boxers' competition simulation, punch speed and punch strength differ between rounds.

2. Definitions

Kickboxing is a combat sport that requires strength and effort and has a structure consisting of high-performance, dynamic and static features. In order for the athlete to exhibit performance in the best way and at the highest level, they need to do very serious high-level studies.

The punching action, which is one of the hand-hitting methods of kickboxing sport, must be performed in the fastest, strongest and most powerful way. Because punching is a very fast and short movement, the energy system used is the high-energy phosphate system.

Kickboxing is one of the motor skills that affects performance and determines competence in sports. Speed has a property that is directly related to force. It is the most intense application of motor actions in the shortest time interval under certain factors depending on the movement basis.

In kickboxing, which is one of the combat sports, the speed of the movement to be made against the opponent during the attack or defence depends on joint mobility and reaction speed.

Flexibility, which is a major factor in the high performance of athletes during competition in martial arts, is important in terms of getting rid of the contra strikes that may come from the opponent and then making moves against the opponent. It also reduces the risk of injury to the lowest level.

3. Research Model

In this research, an experimental study was carried out by collecting data such as the number, speed and power of the punching techniques from participating elite national athletes who are interested in Kick Boxing in TRNC and Turkey, which is one of the kickbox kicking techniques, by using technological sensors.

3.1 Sampling Method

The sample of the study consists of national athletes who do kickboxing at the elite level in TRNC and Turkey. The sample group is composed of 8 athletes from TRNC and 18 athletes from Turkey who are national or international degrees, are aged between 18-25 and weighted about 71-75 kg. Measurements were done on a voluntary basis by going to the athlete's clubs and accompanied by their trainers. Studies were done in 2 different groups.

- The first group is composed of 8 TRNC National team athletes, where studies were done at SBOX Athletic Clubs, located in Nicosia.
- The second group is composed of 18 TR National elite kickboxes. Studies were done at Selahattin AYDIN FIGHT ACADEMY in Istanbul.

3.2 Punching Simulation

A punching simulation can be educational and beneficial for athletes in several ways:

- Technical Development: Athletes can practice proper punching techniques, improving their form and skills. Simulations help them identify and correct mistakes in real-time.
- Reaction Time: Simulations can be designed to enhance quick decision-making and reaction times, providing an advantage in real fight situations.
- Situational Awareness: Athletes can encounter different scenarios, enhancing their strategic thinking abilities. This helps them learn how to respond to their opponent's movements.
- Strength and Endurance Analysis: Simulations allow athletes to test their strength and endurance levels, aiding in the optimization of their training programs.

- Psychological Preparation: Competing in a virtual environment can help athletes develop psychological skills like stress management and mental resilience.
- Reduced Injury Risk: By practicing in a simulated environment, athletes can minimize the injury risks associated with real sparring sessions, allowing for safer practice.
- Feedback and Analysis: Simulations can be used to analyze performance and provide feedback, helping athletes understand which areas need improvement.

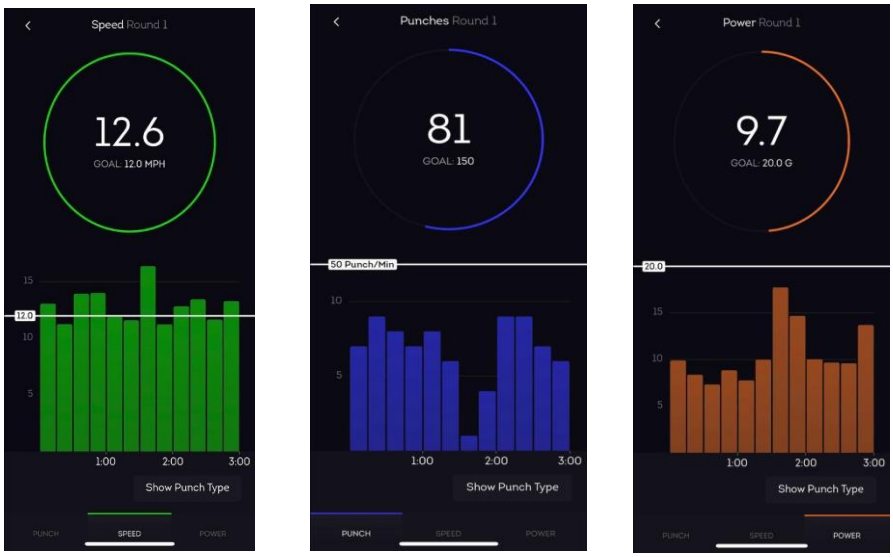
3.3 Tools and Methods

In this research, the contestant Kickboxers acted within the framework of professional contest rules and were dressed with a formal dress code. This research was done with simulation characters because it is not allowed to have extra equipment at the formal competition. Punching techniques, numbers of punches, punch speed and punch strength, were measured with sensors which was placed under hand bandages in kickboxing gloves by kickboxing's most common K-1 form in 3 minutes long 3 rounds.

Measurement Tools

Photo.1: Corner boxing training technology

Measurement: Below data has been measured by the measurement device.



Mold 1. Number of punch Graph Mold 2. Punch Speed graph Mold 3. Punch Strength graph

Place of Measurements

Photo 2. The moment of placing the sensors inside the hand bandages before the test at Nicosia region.

Photo 3. Contest simulation test at Nicosia Region

Photo 4. Athletes traning moments before contest simulation at Istanbul Region

4. Results

Direct, hook and uppercut hitting styles were studied in three different rounds depending on the number, speed and power relations. Pearson and Spearman's Rho analysis was used in Correlation analysis by using the obtained results. A positive correlation was seen in every round if it was analysed in number, speed and power relation. Assets were found initiated in P<0.05 and P<0.01 limit. When this relation was tried to make sense, it was understood that false results were depending on 5% and 1 % chance. Regarding the result of the power analysis, crochet and uppercut were increased and it was determined that participants spend a lot more power on these types of hits. Direct hit number analysis increased up to P<0.01 and especially some relations were shown a negative correlation in 3rd round. Regarding the previous explanation, power and speed increased or decreased depending on the hit number from time to time. Considering the crochet punch, the power correlation showed a significant correlation. This correlation level changes as positive and negative in different rounds. When the uppercut is considered, the power analysis mostly has a negative relationship at P<0.05 and P<0.01 levels according to number and speed. When the number and speed increased the power decreased or when the number and speed decreased power increased has been seen.

Table 1. Direct punch analysis of participants on rounds 1-2-3.

	N(number)	Total	Arithmetic average	St. Deviation
round1 number	26	1134	43.62	9.575
round1power	26	346.4	13.323	2.9195
round1 strength	26	313.1	12.042	2.0098
round2 number	26	998	38.38	11.053
round2 power	26	329.8	12.685	2.2103
round2 strength	26	316.9	12.188	2.0393
round3 number	26	994	38.23	10.199
round3 power	26	327.3	12.588	2.2290
round3 strength	26	303.1	11.658	2.1094
Valid N (listwise)	26			

Table 2. Crochet hit analysis of participants on rounds 1-2-3

	N(number)	Total	Arithmetic average	St. Deviation
round1number	26	804	30.92	8.333
round1speed	26	302.1	11.619	1.9428
round1power	26	341.8	13.146	2.4902
round2number	26	819	31.50	9.301
round2speed	26	302.9	11.650	1.9148
round2power	26	350.4	13.477	2.3323
round3number	26	743	28.58	7.506
round3speed	26	299.4	11.515	1.7169
round3power	26	346.5	13.327	2.3028
Valid N (listwise)	26			

Table 3. Uppercut analysis of participants on rounds 1-2-3

	N(number)	Total	Arithmatic Average	St. Deviation
round1numbet	26	467	17.96	5.032
round1speed	26	310.5	11.942	2.0644
round1power	26	351.4	13.515	2.1782
round2number	26	488	18.77	5.935
round2speed	26	291.8	11.223	1.7542
round2 power	26	424.1	16.312	15.2158

round3number	26	443	17.04	5.032
round3speed	26	292.7	11.258	1.5667
round3power	26	350.9	13.496	2.3751
Valid N (listwise)	26			

Table 4. Direct hit correlation analysis

		round1adet	round1hız	round1guc	round2adet	round2hız	round2guc	round3adet	round3hız	round3guc
round1adet	Pearson Correlation	1	.102	.310	.566**	.144	.370	-.058	-.050	.128
	Sig. (2-tailed)		.620	.123	.003	.484	.063	.777	.807	.532
	N	26	26	26	26	26	26	26	26	26
round1hız	Pearson Correlation	.102	1	.646**	.349	.739**	.577**	.359	.701**	.517**
	Sig. (2-tailed)	.620		.000	.081	.000	.002	.072	.000	.007
	N	26	26	26	26	26	26	26	26	26
round1guc	Pearson Correlation	.310	.646**	1	.407*	.715**	.831**	.341	.635**	.757**
	Sig. (2-tailed)	.123	.000		.039	.000	.000	.089	.000	.000
	N	26	26	26	26	26	26	26	26	26
round2adet	Pearson Correlation	.566**	.349	.407*	1	.399*	.639**	.509**	.308	.570**
	Sig. (2-tailed)	.003	.081	.039		.043	.000	.008	.126	.002
	N	26	26	26	26	26	26	26	26	26
round2hız	Pearson Correlation	.144	.739**	.715**	.399*	1	.613**	.448*	.879**	.585**
	Sig. (2-tailed)	.484	.000	.000	.043		.001	.022	.000	.002
	N	26	26	26	26	26	26	26	26	26
round2guc	Pearson Correlation	.370	.577**	.831**	.639**	.613**	1	.512**	.603**	.888**
	Sig. (2-tailed)	.063	.002	.000	.000	.001		.007	.001	.000
	N	26	26	26	26	26	26	26	26	26
round3adet	Pearson Correlation	-.058	.359	.341	.509**	.448*	.512**	1	.533**	.622**
	Sig. (2-tailed)	.777	.072	.089	.008	.022	.007		.005	.001
	N	26	26	26	26	26	26	26	26	26
round3hız	Pearson Correlation	-.050	.701**	.635**	.308	.879**	.603**	.533**	1	.602**
	Sig. (2-tailed)	.807	.000	.000	.126	.000	.001	.005		.001
	N	26	26	26	26	26	26	26	26	26
round3guc	Pearson Correlation	.128	.517**	.757**	.570**	.585**	.888**	.622**	.602**	1
	Sig. (2-tailed)	.532	.007	.000	.002	.002	.000	.001	.001	
	N	26	26	26	26	26	26	26	26	26

**. Correlation is significant at the 0.01 level (2-tailed).

*. Correlation is significant at the 0.05 level (2-tailed).

Table 5. Crochet hits correlation analysis

		round1adet	round1hız	round2adet	round1guc	round2hız	round2guc	round3adet	round3hız	round3guc
round1adet	Pearson Correlation	1	-.215	.758**	.501**	-.147	.489*	.429*	-.032	.091
	Sig. (2-tailed)		.291	.000	.009	.475	.011	.029	.879	.658
	N	26	26	26	26	26	26	26	26	26
round1hız	Pearson Correlation	-.215	1	.083	.452*	.625**	.346	.147	.664**	.328
	Sig. (2-tailed)	.291		.688	.020	.001	.084	.474	.000	.102
	N	26	26	26	26	26	26	26	26	26
round2adet	Pearson Correlation	.758**	.083	1	.578**	.030	.464*	.710**	.122	.098
	Sig. (2-tailed)	.000	.688		.002	.886	.017	.000	.551	.633
	N	26	26	26	26	26	26	26	26	26
round1guc	Pearson Correlation	.501**	.452*	.578**	1	.296	.822**	.406*	.302	.530**
	Sig. (2-tailed)	.009	.020	.002		.142	.000	.040	.133	.005
	N	26	26	26	26	26	26	26	26	26
round2hız	Pearson Correlation	-.147	.625**	.030	.296	1	.321	.315	.779**	.344
	Sig. (2-tailed)	.475	.001	.886	.142		.109	.117	.000	.085
	N	26	26	26	26	26	26	26	26	26
round2guc	Pearson Correlation	.489*	.346	.464*	.822**	.321	1	.349	.464*	.763**
	Sig. (2-tailed)	.011	.084	.017	.000	.109		.080	.017	.000
	N	26	26	26	26	26	26	26	26	26
round3adet	Pearson Correlation	.429*	.147	.710**	.406*	.315	.349	1	.441*	.358
	Sig. (2-tailed)	.029	.474	.000	.040	.117	.080		.024	.073
	N	26	26	26	26	26	26	26	26	26
round3hız	Pearson Correlation	-.032	.664**	.122	.302	.779**	.464*	.441*	1	.502**
	Sig. (2-tailed)	.879	.000	.551	.133	.000	.017	.024		.009
	N	26	26	26	26	26	26	26	26	26
round3guc	Pearson Correlation	.091	.328	.098	.530**	.344	.763**	.358	.502**	1
	Sig. (2-tailed)	.658	.102	.633	.005	.085	.000	.073	.009	
	N	26	26	26	26	26	26	26	26	26

**. Correlation is significant at the 0.01 level (2-tailed).

*. Correlation is significant at the 0.05 level (2-tailed).

Table 6. Uppercut hit correlation analysis (Spearman's Rho)

APARKART YUMRUK KORELASYON ANALİZİ (Spearman's Rho)

Correlations

			round1adet	round1hız	round1guc	round2adet	round2hız	round2guc	round3adet	round3hız	round3guc
Spearman's rho	round1adet	Correlation Coefficient	1.000	.093	.381	.672**	.357	.235	.537**	.243	.033
		Sig. (2-tailed)	.	.650	.055	.000	.074	.247	.005	.232	.871
		N	26	26	26	26	26	26	26	26	26
	round1hız	Correlation Coefficient	.093	1.000	.123	-.054	.544**	-.031	-.236	.381	-.413*
		Sig. (2-tailed)	.650	.	.551	.793	.004	.881	.246	.055	.036
		N	26	26	26	26	26	26	26	26	26
	round1guc	Correlation Coefficient	.381	.123	1.000	.199	.093	.399*	.359	.004	.384
		Sig. (2-tailed)	.055	.551	.	.331	.652	.044	.072	.983	.053
		N	26	26	26	26	26	26	26	26	26
	round2adet	Correlation Coefficient	.672**	-.054	.199	1.000	.349	.258	.710**	.195	.076
		Sig. (2-tailed)	.000	.793	.331	.	.081	.204	.000	.341	.711
		N	26	26	26	26	26	26	26	26	26
	round2hız	Correlation Coefficient	.357	.544**	.093	.349	1.000	-.011	.356	.884**	-.189
		Sig. (2-tailed)	.074	.004	.652	.081	.	.957	.074	.000	.355
		N	26	26	26	26	26	26	26	26	26
	round2guc	Correlation Coefficient	.235	-.031	.399*	.258	-.011	1.000	.331	-.013	.592**
		Sig. (2-tailed)	.247	.881	.044	.204	.957	.	.098	.952	.001
		N	26	26	26	26	26	26	26	26	26
	round3adet	Correlation Coefficient	.537**	-.236	.359	.710**	.356	.331	1.000	.362	.356
		Sig. (2-tailed)	.005	.246	.072	.000	.074	.098	.	.069	.075
		N	26	26	26	26	26	26	26	26	26
	round3hız	Correlation Coefficient	.243	.381	.004	.195	.884**	-.013	.362	1.000	.001
		Sig. (2-tailed)	.232	.055	.983	.341	.000	.952	.069	.	.997
		N	26	26	26	26	26	26	26	26	26
	round3guc	Correlation Coefficient	.033	-.413*	.384	.076	-.189	.592**	.356	.001	1.000
		Sig. (2-tailed)	.871	.036	.053	.711	.355	.001	.075	.997	.
		N	26	26	26	26	26	26	26	26	26

**. Correlation is significant at the 0.01 level (2-tailed).

*. Correlation is significant at the 0.05 level (2-tailed).

5. Discussion

The number and speed of direct punches hit by the athletes in the competitions showed an increase compared to other punch types, and then the number and speed of crochet punches also increased. In power evaluations, the uppercut punch type showed a significant increase especially in rounds 2 and 3. Generally, in round 1, the first rounds are more controlled because the opponents try to get to know each other and apply their own combination strategies. However, in some cases, if the contestants discover each other's open and weak points in round 1, they may try to knock out by making faster and stronger hits. Three different punch number analyses used in the study were evaluated according to 26 participants in three different rounds. The arithmetic of the number of direct punches in round 1 (x=43.62) showed the highest number of punches compared to other punch analyses. In round

1, the contestants preferred to use a direct punch in a fast and rapid manner, as they used their energy in a mobile and controlled way. The most common punch number detected was 39. Considering the number analysis, it was observed that the uppercut hit had the least arithmetic mean (x= 17.96). The athletes used the uppercut punch technique less in terms of their combination styles and the caught in the competition. In round 2, values similar to those observed in round 1 were determined. Straight punch (a=38.38), Crochet punch (x=18.77) and uppercut punch (x=18.77) have an average arithmetic list. As determined in the first round, the most common number of punches was 30 in the direct punch. Direct punch standard deviation (SD=10.2) showed parallel standard deviation with normal values. Due to the fact that the competitions started to get tougher in round 2, the athletes started to create pressure and damage on their competitors by using more crochet punch techniques. More power has been used due to the crochet punch technique being performed using the whole body strength. In round 3, the direct punch arithmetic average was higher than the other punch number (x=38.23) But it decreased in round 3. In the last round, the number and frequency of uppercut punches were 16 compared to the rounds and were increased. Although signs of fatigue started in both competitors in round 3, they tried to use guard defending position by evaluating their competitor's tiredness; in punch combinations generally used powerful crochet and uppercut hits instead of being in large quantities or fast.

Considering three types of punching analyzes (m/p), direct punch (x=13.32) has a higher arithmetic average compared to the others. Crochet punch (x=11.62) and Uppercut punch (x=11.94) do not have much difference in correlation average. Uppercut punch speed frequency and punch speed are shown not much difference. The uppercut punch and crochet punch's arithmetic average speed difference is quite less in round 2. ($\underline{x}$= 11.65; $\underline{x}$= 11.22). When three types of punches considered uppercut punch arithmetic average in rounds 1,2, and 3 respectively (x=13.51; x=16.31; x=15.50), it has the highest arithmetic average and standard deviation. Direct punch's arithmetic average speed (x=12.64) and standard deviation (SD=2.21) are increased parallel by the other's numbers.

Direct punch power has the lowest arithmetic average difference than the others in rounds 1,2 and 3 (x=12.04; x=12.19; x=11.66).

Suggestions

Generally, contestants should pay attention to their endurance training programme to minimise fatigue during the contest, also, doing more training contests will develop their physical condition and experience. This study has been made about kickboxers. It can be used in other martial arts. If the study is done during the contest, the result will be better. The research was done on elite kickboxers. However, if similar work is done at younger ages, new training programmes can be created for the insufficient carrying plans of the athletes.

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Navigating Accountability: A Hermeneutic Transcendental Study on Teachers' Responsibility in Integrating Social and Emotional Learning in Mathematics Education

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ABSTRACT
This study explores the dynamics of accountability and responsibility among mathematics educators as they integrate Social and Emotional Learning (SEL) into their teaching practices. Utilizing a hermeneutic transcendental approach, the research examines the lived experiences of teachers, their challenges, and the strategies they employ to balance academic rigor with SEL objectives. This case study captures the voices of educators who are at the forefront of this integration. It examines their pedagogical adjustments, collaborative efforts with colleagues and administrators, and the reflective practices they engage in to enhance their teaching. The research also sheds light on the systemic barriers that hinder the seamless integration of SEL, such as limited resources, lack of training, and lack of accountability measures. The study focuses on teacher connectedness, exploring how strong relationships with students and peers influence the successful integration of SEL. The study highlights how connectedness fosters a supportive and empathetic classroom environment, enhances student engagement, and promotes students' sense of belonging and well-being. Ultimately, this study advocates for a more comprehensive approach to teacher accountability, one that recognizes the multifaceted role of educators in shaping both the educational and emotional needs of their students. This research aims to inform policymakers, educational leaders, and teacher training programs about the critical need for balanced and holistic educational practices, by providing insights into the practical realities of SEL integration in mathematics education.

INTRODUCTION
Integrating social and emotional learning (SEL) into math curriculums is increasingly critical in fostering student success. SEL encompasses essential skills such as emotional regulation, empathy, relationship-building, and responsible decision-making, which are pivotal for students' overall development and academic achievement. Despite its recognized importance, the integration of SEL into mathematics education remains a challenging endeavor, often hindered by a lack of accountability and increasing behavioral issues among students. Teachers who incorporate SEL competencies into their academic curriculum have been shown to have increased student achievement and engagement. However, there is not much research on how to create or ensure teacher ownership.

RESEARCH PROBLEM AND PURPOSE
The integration of Social-Emotional Learning (SEL) in mathematics classrooms faces significant challenges due to a lack of responsibility and accountability among educators. Many teachers report insufficient training and professional development opportunities on how to effectively incorporate SEL into their mathematics instruction (Sami, 2024). Consequently, some educators need to take ownership of the SEL components within their academic teaching. While some teachers independently develop SEL supports within their classrooms, they often feel they need more support to integrate these competencies effectively. Even before the pandemic, teachers have consistently expressed a need for Support and training in classroom management and positive behavior interventions (Franks, 2020; Pignatiello, 2020). There are currently no formal mechanisms to hold teachers accountable for incorporating SEL into their teaching practices (Hwa, 2022; Skedsmo & Herber, 2019). Unlike academic performance, which is frequently assessed through standardized tests and evaluations, SEL integration is rarely monitored or evaluated in a way that can be quantified (Berg et al., 2021; Martinson et al., 2020). This lack of accountability can result in inconsistent and non-committal SEL practices among educators.
This study aims to investigate teacher responsibility and accountability in integrating Social and Emotional Learning (SEL) into mathematics education. The hermeneutic phenomenological research case study aims to explore teacher experiences, interpret the potential impact teachers have when they take responsibility for SEL integration within the classroom, and highlight the importance and effectiveness of teacher connectedness in relation to teacher ownership.

BACKGROUND
Historically, the issue of student behavior or the importance of character education stemmed from an educational system that prioritized cognitive development at the expense of students' holistic well-being (Demetriou et al.,

2022; Govorova et al., 2020). The approach to putting cognitive development ahead of all else in education is deeply rooted in traditional educational structures that emphasize acquiring knowledge and intellectual skills while often neglecting the social and emotional dimensions of learning. As a result, educational policies and practices were primarily designed to enhance academic performance, with little consideration for students' emotional and social needs (Ye & Shih, 2021; Tyler, 1919). This narrow focus on cognitive development created an environment where the holistic well-being of students was overlooked, leading to gaps in their overall development and preparedness for real-world challenges (Borowiec et al., 2021; Norozi, 2023; Stodden et al., 2023;).

Socially, schools and communities are struggling with teachers managing student behaviors due to student emotional unrest and student trauma that COVID-19 brought to light (Herrera et al., 2022; Stratford et al., 2020). The period of the COVID–heightened levels of stress marked 19 pandemic a noticeable decline in overall mental health, and a surge in negative behaviors among students ((Hanetz-Gamliel et al., 2021; Phelps & Sperry, 2020). These changes have been attributed to the disruptions caused by the pandemic, including prolonged isolation, uncertainty, and the shift to remote learning environments (Cipriano et al., 2023; McCabe, 2024). The compounded effects of these stressors have left many students struggling to cope, highlighting the urgent need for enhanced mental health support and interventions in educational settings (Hanetz-Gamliel et al., 2021; Phelps & Sperry, 2020). Teachers cannot take responsibility for student behaviors due to a lack of training and understanding of what character education or social and emotional support is for students (Kurniawan et al., 2022; Martinez & Partin, 2023). Something that has been proven to make a difference in teacher connectedness is the degree to which students feel personally accepted, valued, involved, and supported by their teachers (Garcia-Moya et al., 2021; Mohd Khatib et al., 2022).

Teacher connectedness theory serves as the foundational theoretical framework for this case study on teacher responsibility in integrating social and emotional learning within mathematical education. Teacher connectedness theory emphasizes the importance of strong, positive relationships between teachers and students in fostering a supportive and effective learning environment (Maloney & Matthews, 2020; Tranchina & Zambak, 2021). Grounded in the foundation that when students feel connected to their teachers, they are more likely to engage in the learning process and exhibit positive behaviors, this theory has the potential to help students achieve academic success (Arslan, 2021; Ferreira et al., 2020). An important health asset during the adolescent years is the degree of connectedness students have to their school and their teachers, which positively impacts educational outcomes (Brookings, 2022; CDC, 2021; Springer, 2021) Leaning on several educational theories such as attachment theory, self-determination theory, and social Support models by using teacher connectedness theory, supports both the academic and social-emotional development of students while trying to create an inclusive environment.

ATTACHMENT THEORY

Attachment theory, as proposed by Bowlby (1969), poses that students' internal working models of their relationships with teachers significantly influence their perceptions of peer interactions, their capacity to trust others, and their overall social competence within their peer groups (Van Rosmalen et al., 2016). Within a school setting, attachment relationships are established throughout the educational process (Hicks & Korbel, 2024; Forslund & Duschinsky, 2021). The teacher-student relationship acts as a crucial mediator in this context. A positive and supportive relationship with teachers can help students navigate conflicts more effectively, promoting healthier coping mechanisms and emotional regulation (Main & Ellerbrock, 2023; Robledo et al., 2022). Teachers who provide a secure and nurturing environment can help students internalize positive behaviors and attitudes, fostering resilience and social competence. The degree of conflict experienced during this period influences students' externalization and internalization processes, which are mediated by the teacher-student relationship (Ahmadi et al., 2023; Guay, 2022).

SELF- DETERMINATION THEORY

Research conducted by Edward Deci and Richard Ryan (2021) highlights the intrinsic human desire for growth and fulfillment. Their self-determination theory (SDT) elucidates how social environments can either facilitate or impede an individual's motivation to achieve success (Koestner & Holding, 2021; Ryan & Deci, 2024; Vallerand, 2021). According to SDT, fulfilling the basic psychological needs for autonomy, competence, and relatedness is essential for fostering intrinsic motivation (Koestner & Holding, 2021; Vallerand, 2021). The concept of relatedness refers to the need to form close social relationships and was initially defined as the desire to feel a sense of belonging and connection with others (Roza et al., 2012; Saxer et al., 2024). This fundamental human need is crucial for emotional well-being and personal development (Mosewich et al., 2022; Perkins et al., 2021; Saxer et al., 2024). When individuals experience a sense of relatedness are prone to feeoing valued and supported, within their social circles (Schmidt et al., 2021; Van Petegem et al., 2023). This sense of connection can enhance motivation, engagement, and overall satisfaction in various aspects of life, including educational and professional settings (Núñez-Regueiro et al., 2024). Understanding and fostering relatedness can lead to more cohesive and

supportive communities, ultimately contributing to the holistic development of individuals (Collie etet al., 2020; Jiménez et al., 2021). Furthermore, adverse classroom behaviors significantly affect educators and students, underscoring the importance of addressing these issues to create a conducive learning environment (Chang & Taxer, 2021; Glock & Pit-ten Cate, 2021; Granger et al., 2021).

SOCIAL SUPPORT MODELS

Social support models for education refer to frameworks that describe how social networks and relationships provide emotional, informational, and practical assistance to individuals (Cooper et al., 2024; Lewis & Foye, 2022). These models emphasize the importance of supportive interactions in promoting mental health, well-being, and resilience (Gillard, 2019; De Beer et al., 2022). By building strong, supportive relationships with students, teachers can significantly impact their motivation, engagement, and overall success(Tineo et al., 2024; Wachs et al., 2022). This Support can manifest in various forms, such as providing encouragement, offering constructive feedback, and being available to listen to students' concerns (Fullerton et al., 2021; Grapin & Sulkowski, 2022). Social Support can come from various sources, including family, friends, teachers, and peers, and is essential to help people cope with stress and challenges (Cooper et al., 2024; Heberle et al., 2021). By leveraging attachment theory and self-determination theories, teachers are committed to creating an inclusive learning environment that supports both math goals and the social-emotional development of their students.

MATH ANXIETY

Math anxiety is a widespread phenomenon characterized by a profound sense of dread or apprehension when individuals face mathematical tasks, often leading to diminished performance and obstructed learning trajectories (Cheung et al., 2023; Szczygiel, 2020). This psychological barrier can significantly impede one's ability to engage with mathematical concepts, creating an environment where the fear of mathematical challenges overshadows the potential for academic achievement. However, math anxiety is not insurmountable. Research by Aldrup et al. (2020) and Samuel & Warner (2021) highlights effective strategies to mitigate its adverse effects. A critical approach involves identifying and understanding the specific triggers that evoke anxiety in mathematical contexts. By pinpointing these triggers, individuals can proactively address anxiety issues while creating and maintaining positive relationships and creating mathematical concepts.

SOCIAL AND EMOTIONAL LEARNING

Teachers need the knowledge and tools to create a loving atmosphere where students are valued, understood, and supported in their emotional growth and social interactions (Orgel, 2022; Sears et al., 2022). Empowered teachers who navigate the complex dynamics of the modern classroom foster a more conducive learning environment (Filderman et al., 2023; Von der Embse et al., 2020). Teachers who implement SEL competencies within the classroom remain attuned to students' evolving needs and challenges, adapting their teaching approaches accordingly. The benefits of this training extend beyond immediate student impact, encompassing a transformative effect on educators themselves. Supporting teachers with strategies to embed in SEL training, schools are empowered to deftly navigate the intricate and dynamic landscape of the modern classroom (Filderman et al., 2023; Von der Embse et al., 2020). This empowerment translates into a multifaceted enhancement of the teaching profession, influencing instructional methodologies and the overall classroom atmosphere. Thus, investing in robust SEL training for teachers is a fundamental step toward enhancing students' overall educational experience and well-being (Orgel, 2022; Sears et al., 2022).

GAPS IN LITERATURE

There needs to be more empirical datafocus on mathematics teachers' perceptions of integrating SEL. Most existing research tends to be broader, encompassing general teacher attitudes toward SEL without delving into subject-specific nuances.

There is a gap in understanding the effectiveness of professional development programs aimed at equipping mathematics teachers with resources on integrating SEL into their teaching practices. How these programs impact teachers' perceptions and accountability remains underexplored.

Limited research connects mathematics teachers' integration of SEL with specific student outcomes in mathematics. Studies often focus on general academic or behavioral outcomes without isolating the impact on mathematics achievement and engagement.

RESEARCH QUESTIONS

The central research question was: How do mathematics teachers perceive their responsibility and accountability in integrating SEL into their teaching practices?

RESEARCH METHODOLOGY

A research design was a single-case study that required a group of participants with specific characteristics. The participants were novice and veteran teachers with three to twenty-five years of teaching experience from urban and suburban school districts. All teachers were math teachers teaching math to students in grades three through eight; however, the study did not take place on an actual site as everything was conducted via the computer. Researchers collected qualitative data from the open-ended interview questions, open-ended open-ended focus group questions, and a written prompt after the focus group experience. The sample was selected based on their willingness to participate in the study and their ability to provide access to students who meet the study's criteria. Purposive sampling was used when selecting individuals for this study. Purposeful sampling entails intentionally selecting individuals with information relevant to the research problem (Bassot, 2022). The recruitment process, spanning approximately two months, involved reaching out to superintendents and school principals to gauge a teacher's interest in joining the study and reaching out to participants. Recruitment letters were sent within school districts and posted on online social media.

While the original data collection was in a transcendental phenomenology study that consisted of interviews, focus groups, and a written prompt (Aguas, 2022; Meihami & Rashidi, 2022), this study included a hermeneutic element. The validity of the findings was reinforced by triangulating the data, which involved the use of multiple sources to obtain rich experiential descriptions from participants. This study involved a reflective interpretation of texts or experiences to uncover deeper meanings (Dangal & Joshi, 2020). The study was completed by the researcher engaging in interpreting and reinterpreting data to reveal the phenomenon's essence. Interviews and focus group questions were analyzed and grouped based on the interpretation of teacher ownership as a strong result of interpreting data along with the answers from written prompts.

FINDINGS

This hermeneutic phenomenological study aimed to look at the lived experiences of elementary and middle school math teachers with social and emotional learning (SEL) and math achievement teacher connectedness through a lens of teacher connectedness. Data was collected through interviews, focus groups, and written prompts. The analysis involved organizing and interpreting the data through a hermeneutic lens, emphasizing the contextual and historical backgrounds of the participants. The researcher engaged in a cyclical process of interpretation, known as the hermeneutic circle, to uncover deeper meanings and insights (Dangal & Joshi, 2020). Themes were identified through an iterative review of transcripts, considering the interplay between the parts and the whole of the data. The researcher then examined the underlying structures and contexts that influenced participants' thoughts and emotions, providing a rich, contextual understanding of their experiences.

Multiple themes emerged from this study, highlighting critical aspects of the educational environment. School responsibility was a prominent theme, emphasizing the role of schools in fostering a supportive and accountable atmosphere for both teachers and students. Emotional resilience emerged as another critical theme, underscoring the importance of helping students and teachers develop ways to deal with stress and anxiety. The theme of SEL education accountability focused on the need for schools to ensure that social and emotional learning (SEL) programs are effectively implemented and evaluated. Finally, effective communication was identified as essential for building solid relationships and facilitating collaboration among students, teachers, and administrators. These themes collectively illustrate the multifaceted nature of educational experiences and the interconnectedness of various factors in ensuring a positive learning community and environment.

SCHOOL RESPONSIBILITY

School responsibility involves being accountable for students' outcomes and ensuring that the administration's actions are reliable and trustworthy. The codes of administration support, school support, leadership, and teacher self-efficacy appeared 39 times within the documents during the data analyzation process. Combined with the codes of student engagement, student responsibility, and student ownership, which fall under the school's theme of taking responsibility for student learning and behavior, teachers felt strongly that this contributed to the connection they create with students.

Beth stated, "I am an authority figure and in a position where I actually have to tell if something too off base is going on in the classroom and make adjustments. I make sure I am attentive with students, you know, so just sitting and listening. I have to create a sense of belonging and like connection and all of that, you know, we have had to have some come to Jesus' moments because of teasing and bullying, and all of that in the classroom needs to be addressed. I have had actually to take action, you know." Beth's statement conveys a sense of responsibility and vigilance. She feels the weight of her role as an authority figure, emphasizing the importance of being attentive, creating a sense of belonging, and proactively addressing issues like teasing and bullying.

Within the study, Eric, Beth Isabella, Sarah, Rebecca, and Emma displayed the common thought of the importance of being proactive and assertive in their roles as math teachers. These teachers had a strong sense of self and a strong sense of what needed to be done to support students. A strong sense of self-efficacy and a responsibility to empower students was evident.

EMOTIONAL RESILIENCE

Emotional resilience seen in this study as the ability to adapt to stressful situations and effectively manage and recover from emotional challenges is a strong theme in the importance of teacher connectedness and teachers taking responsibility for the SEL education of their students. Involves the codes of sense of belonging, perseverance, compassion, empathy, connection, classroom community building, emotional intelligence, emotional regulation, math self-confidence, positive classroom environment, real-life connection, sense of community, student collaboration, student motive, and student trauma, this theme held over 421 codes, the strongest of which being empathy, emotional intelligence of students and connection. According to teachers, the quality of having emotional intelligence allows students to bounce back and continue growing despite difficulties. Isabella stated, “But if I were to select one quality students are getting better at, I would say the responsible choices. I think that they are aware of themselves and each other, and I think it's just kind of gauging when to do what, how, and what would be best for whatever the circumstances are at that time. I think they are hyperaware of each other. They love to check each other. They gotta check themselves, and that is one of the things I mean they, I mean they give wonderful feedback, and I applaud them for it.” Isabella felt that the students who could regulate themselves or learned to regulate their own emotions were more successful in class.

Within the study, Janet, Olivia, and Linda emphasize the importance of creating a supportive and inclusive classroom environment. The participants conveyed that focusing on rewarding positive behavior, addressing and normalizing struggles, and fostering a sense of belonging and family among students strengthens the sense of community within the classroom.

SEL EDUCATION RESPONSIBILITY

SEL Education's responsibility within the study is when teachers see the importance of implementing an SEL program within the class and take steps to ensure the program’s success. Within the code of trauma training, teaching kindness, SEL training, positive behavior incentives, and adjusting based on student behaviors, 112 instances were cited within the document. Including codes of adjusting classroom norms and other cooperative strategies, teachers felt responsibility had to be taken to support SEL learning in the classroom.

Fran spoke on the importance of SEL education responsibility as a teacher but also from Support from admin, "I feel like my we have a brand new principal this year, and she is awesome, and she what she did was at the beginning of the year, she surveyed all the staff and said what do you feel like your biggest struggle is and what would help you the most? And then she has sought other professional development just specifically for what we said. They also gave us specific training on the things that we said were hardest for us. So I am blessed in that area because she has been doing such a good job really trying to give us Support. However, I agree with what Emma said: " unless you are gonna take it and run with it and make it your own, it is just an hour that you sat there and listened to professionals tell you how to do it." Fran spoke about how to take responsibility for emotional and social care in your classroom. Ava, Sofia, and Mona emphasized the need to use evidence, whether through data, attentiveness, or effective lesson planning, to make informed decisions and positively impact their educational environments.

EFFECTIVE COMMUNICATION

According to participant responses, effective communication can be seen as the process of exchanging information, ideas, thoughts, and feelings in a way that is received well and understood by all parties involved. Falling under the codes heaviest in relation building, growth mindset, and open communication with 347 codes, teachers felt that effective communication was vital in teacher connectedness when implementing a strong SEL program. Codes under this umbrella also included communication skills, family partnership, honesty in making mistakes, parent involvement, trust building, and social aspects of teaching.

Jennifer expressed the importance of setting high expectations and communicating effectively with students to promote equity and increase growth; she stated, "I don't expect anything from my students that I would not expect from myself. Umm. If they need to move, I let them move, but they know the parameters. When I was in a first-grade classroom, I taped off a rectangle in the back of the room, and it was their wiggle spot. I do not get angry if they are angry. Typically, I do not. You know, sometimes I'm having big feelings that day too. I am, but no, I just let them be human because they have to learn somewhere, and if they do not know, they are obviously missing something.”

Open communication was highlighted by 17 of the 18 participants in the study. It was frequently mentioned in the context of peer-to-peer interactions, teacher-to-student interactions, and teacher-to-parent interactions. Participants who appeared to be successful in their classrooms consistently referenced the importance of transparency and kindness in their communication. They emphasized that these qualities are essential for building solid relationships within the school and classroom, fostering a supportive and collaborative environment that benefits both students and educators. Additionally, open communication was seen as a critical factor in addressing and resolving conflicts effectively, ensuring a positive and inclusive learning atmosphere.

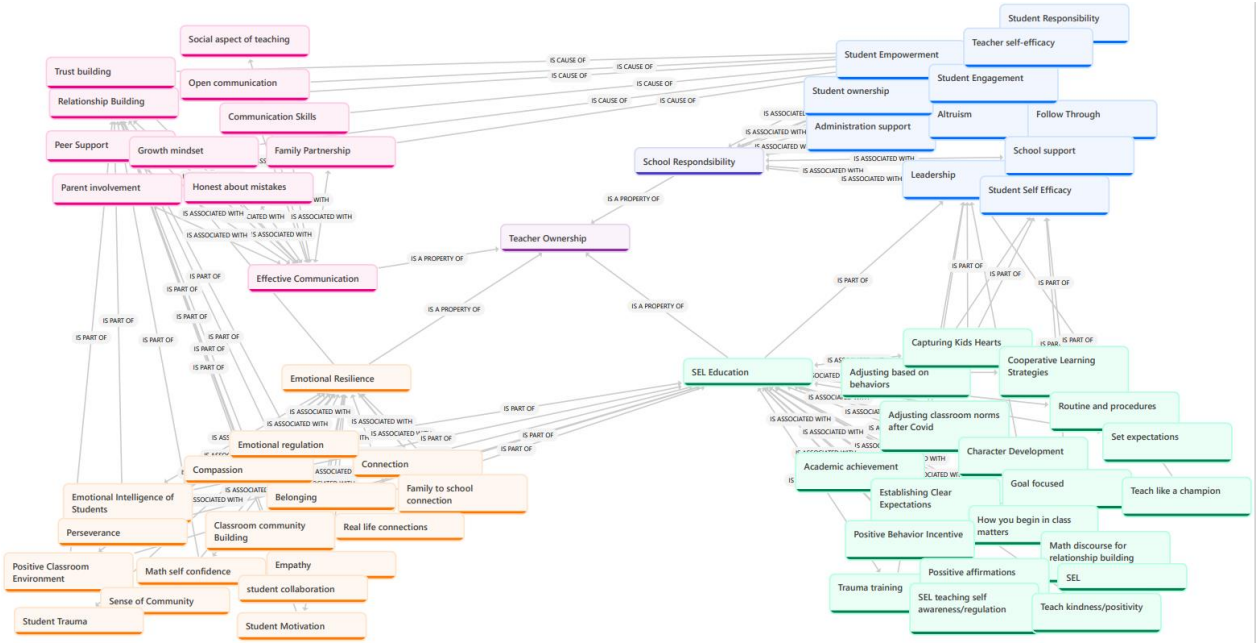

Figure 1: *Teacher Ownership codes*

CONCLUSION

The central research question of this study explored how mathematics teachers perceive their responsibility and accountability in embedding SEL teaching practices within the curriculum. The findings revealed that an overwhelming number of teachers showed the importance of teacher ownership as the decisive factor in successfully incorporating SEL. Although teachers did not state outright that they see teacher ownership as a deciding factor, based on their responses and the interpretation of their answers, this strongly felt unknown factor makes teachers successful. Teachers expressed their sense of ownership over their teaching methods and the SEL curriculum, significantly influencing their commitment to and effectiveness in integrating SEL. This sense of ownership was shown by their personal investment in students' holistic development, their confidence in implementing SEL strategies, making up their own SEL strategies to support students, and their belief in the positive impact of SEL on students' academic and emotional growth. The responses highlighted that when teachers feel a strong sense of responsibility and accountability, they are more likely to take proactive steps to embed SEL into their daily teaching practices, thereby fostering a supportive and emotionally resilient classroom environment.

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Role of Relatedness in Higher Education of Chinese Students - A Self Determination Theory Perspective

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ABSTRACT
Most research on self-determination theory applications in education focuses on competence and autonomy (Wigfield et al., 2019; Vallerand, 2000). After reviewing its mini theories and relevant recent research, this study argues that relatedness is central to motivation in higher education, as seen in a social context. Specifically, through relatedness, students are presented with alternatives to make choices. Such experience prescribes an internal perceived locus of causality, protects students from falling "prawn" to extrinsic motivation, and consequently improves intrinsic motivation (Deci & Ryan, 1985, p. 154). The hypothesized model is tested using PROCESS macro (Hayes, 2013) based on survey responses from 107 Chinese students regarding learning autonomy and intrinsic motivation, and the results show that relatedness has a complete mediation effect on the relationship between i) autonomy and motivation, ii) competence and motivation. In other words, relatedness complements why autonomy and competence lead to intrinsic motivation. Findings suggest new interpretations of best practices in higher education and open new directions for future research.

INTRODUCTION
"It's not the full Yale experience, but it's something." (Kim, 2015) After recording his whole lecture series on game theory, former provost of Yale University Professor Polak shared comments on Yale Daily News. In traditional classrooms, instructors always make grading and attendance policies. Therefore, it is hard to tell whether students attend the classroom because they truly enjoy the learning experience. However, in massive online open courses, those who watch the recordings will be more likely to enjoy and be motivated by the learning activity (Barak et al., 2016). Otherwise, they can spend time on entertainment or shorter popular science content recommended for second perspectives.

View counts from the most popular courses in engineering (Machine Learning taught by Professor Andrew Ng) (Stanford, 2008), social science (Justice taught by Professor Michael Sandel) (Harvard, 2009), and business (Finance Theory taught by Professor Andrew Lo) (MIT, 2013) tells a different story. The view counts comparison between the first two to six lectures and the last two to six lectures, which is shown to decrease significantly over time, as in Table 1. Similar trends can be found in almost any other popular open course. From this observation, the motivation for learning quickly fades away even when the teaching contents cater to the target students' interests.

Table 1. View Counts of Popular Open Courses

	2	3	4	5	6	-6	-5	-4	-3	-2
ML	839k	455k	323k	259k	210k	108k	116k	76k	75k	70k
Finance	2.2m	884k	462k	516k	327k	140k	100k	76k	80k	59k
Justice	5.3m	3.3m	2.7m	1.5m	1.9m	1.3m	1.4m	1.2m	953k	805k

Like what happened in massive online open courses, instructors in the traditional classroom setting would realize that halfway through the course, students may have already lost their interest in the classroom. Student participation and involvement in classroom activities could become increasingly limited (Legault et al., 2006). This raises the question of why students get intrinsically motivated and what can be done to keep students motivated.

Based on survey data from 107 respondents with undergraduate education experience, this study finds out that the missing complementary piece in an educational experience, as implied by Professor Polak in the beginning

paragraph, can be "relatedness", as one of the three psychological needs in self-determination theory for improving intrinsic motivation. On a theoretical level, relatedness provides necessary choices for students to retain the internal perceived locus of causality, which increases intrinsic motivation.

LITERATURE REVIEW

Self Determination Theory

Since the 1970s, Edward L. Deci and Richard Ryan co-founded self-determination theory. It was seen as a breakthrough to the dominating behaviorism in the 20th century, characterized by "black box" thinking on motivation research (Ryan, 2019). When self-determination theory was first proposed, experiments demonstrated that monetary rewards as an extrinsic motivation caused a decrease in intrinsic motivation (Deci, 1971). At its root, the self-determination theory is built on previous works of attribution theory and the assumption that the nature of the perceived locus of causality parallels dimensions of motivation (deCharm,1983). An excellent example to illustrate the point is that studies have shown that intrinsically motivated students would typically attribute success in learning to working hard, which is internal and changeable (Dickinson, 1995). Following this line of thought, self-determination theory takes an organismic approach and claims that motivation requires satisfaction of three inherent needs: autonomy, competence, and relatedness (Deci, 2012).

Two directions are worth further elaboration here. First, according to self-determination theory, motivation can be categorized into amotivation, extrinsic motivation, and intrinsic motivation (Ryan et al., 2019). The important differentiation between the latter two is that while extrinsic motivation requires reward or punishment, intrinsically motivated people can draw inherent satisfaction from the activity. For this study, every individual respondent shall be treated as having a motivational profile (Wang et al., 2016) with dimensions of both extrinsic motivation and intrinsic motivation. The two types of motivation are not antithetical to each other. Describing someone with decreasing intrinsic motivation means that the relative salience of intrinsic motivation relative to extrinsic ones was reduced.

Second, the definition of each need shall be clarified. Autonomy does not denote the anarchy type of autonomy (Garcia, 1996); on the contrary, autonomy in the self-determination theory means students can self-regulate (Deci, 2012). Competence means feeling capable of negotiating critical activities. For relatedness, the best definition can be similar to "the need to belong" (Baumeister, 1995), i.e., the need to be cared for by others. It is worth pointing out that most traditional self-determination theory research in education is conducted at high school or below, where relatedness takes on primarily a passive tense. The questionnaire prepared for this study takes a more proactive stance, stating that students in their undergraduate education are deemed capable of taking action to generate relatedness. This modification was inspired by Bandura's self-efficacy construct (1977).

In recent years, self-determination theories have found applications in social issues, including education, health care, work environment, and physical activities (Deci, 2012). However, this widespread influence does bring discontent when the mechanism between the three needs is much less clarified. In addition, a more specific understanding of the theory is critical to operationalizing the research findings (Johnson, 2009). Therefore, three mini theories were developed to support further applications of the theory, which are (i) cognitive evaluation theory ("CET"), (ii) causality orientation theory ("COT"), (iii) organismic integration theory ("OIT") (Deci & Ryan, 1985, p. 9). The first two are interrelated, for which "choice" would serve as the fundamental crux and will be further reviewed at the end of the "Model Development" section.

Empirical Evidence in Education

Historically, education was studied as embedded in its social context. Teachings were generalized as cultures being passed on to the next generation through the means of collaborative problem-solving that typically would bring immediate recognition (Vygotsky, 1978). Therefore, from its origin, the interface of self-determination theory in psychology and theories in education can be seen as bridged by the central construct of "relatedness", i.e., it is through relatedness that autonomy and competence can be adequately manifested in social contexts.

Unfortunately, the reforms of education do not lack detours from education's traditions. It has been documented that the institutionalization of education once gradually decontextualizes the practices from their roots (Ryan & Powelson, 1991). Deeply influenced by social Darwinism, education from the 1940s to the 1970s took on a "law of the jungle" mentality. Later criticism would coin a new concept called "rugged individualism," where individuals are kept in isolation to be "programmed" into the best of themselves (Johnson, 2009; Skinner, 1968). One practice that emerged from this school of thought is high-stakes testing, which quickly became prevalent. Students in such settings can go through the curriculum at their own pace, and those who score high scores would feel competent for themselves. What causes controversy for self-determination theorists is that high-stakes testing is usually found to have a negative influence on teachers' classroom practices (Korentz, 2017), promotes

various types of gaming coupled with the manipulation of scores and records (Ryan & Brown, 2005), and may bring side effects like depression and anxiety (Elliot et al., 2011).

Model Development

To simplify the graphical presentation in this section, intrinsic motivation would be denoted by "IM", autonomy would be denoted by "AT", relatedness would be denoted by "RL", and competence would be denoted by "CP". Studies on self-determination theory have shown that relatedness will play a central role in inherently social activities (Vallerand, 2000), with education being an example, as mentioned at the beginning of the previous section. Particularly given the information provided above, this model brings focus to the role of relatedness by contrasting: (i) From the perspective of self-determination theory, autonomy, competence, and relatedness would bring motivation, and (ii) In high stakes testing, the combination of autonomy and competence has been shown to decrease the intrinsic motivation. Besides, traditional reforms other than high-stakes testing tended to emphasize autonomy or competence and also turned out to be short-lived failures (Johnson, 2009). Therefore, autonomy and competence in the context of education will be adapted in this study as not having a significant effect on intrinsic motivation (dashed line in Figure 1). This would put intrinsic motivation at less salient positions in the students' motivation profile, thus making it appear as if it has decreased. Instead, the causal relationship is established from autonomy to relatedness. In more recent research, Deci and Ryan (2014) found that when people in a relationship experience autonomy, their relationship quality improves.

On the competence and relatedness relationship side, research from cooperative learning, a close line of inquiry to applied self-determination theory in education (Wigfield, 2019), has shown to be promising. Tjosvold (2003,2006) showed that in competitive cooperation, when participants have a fair winning chance and track records of reaffirming the competence of participants, the nature of competition tends to be more constructive. In a more general case, competence allows less self-worth protection, thus encouraging attributional search when facing failure in relationships (Mayerson & Rhodewalt, 1988). In other words, satisfaction of competence needs increases relatedness exposure. This subtle mechanism, its relevance to effects on intrinsic motivation, and the overall salience of relatedness require further justification.

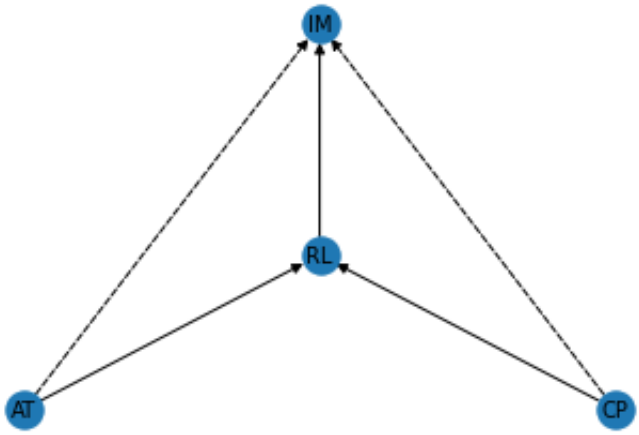

Figure 1. Self-Determination Theory in Higher Education

At this point, the CET and COT theories shall be revisited. Notably, the CET theories specified a process where external rewards could lead to an internal perceived locus of causality when individuals are given choices (Ryan & Deci, 1980). It comes with the benefit that true choices bring more energy and vitality to support sustained intrinsic motivation for activities (Moller et al., 2006). Within the COT theory, behavior based on choice is, by definition, self-determined and bears the autonomy orientation itself (Deci & Ryan, 1985, p. 154).

In high-stakes tests, grades are external regulation. By deliberately replacing relatedness with isolation, students are prone to fall "prawn" (deCharm, 1968) to grades as a cognitive goal. On the contrary, when students are allowed to grow relatedness, they are immediately presented with alternatives from a much more versatile category (Johnson, 2009). Admittedly, what comes along with relatedness can remain external or heavily mixed. However, students can now experience the process of making choices between cognitive and (or within) affective alternatives, which will, according to the theories reviewed so far, lead to internal perceived locus of causality and intrinsic motivation (Ryan & Powelson, 1991).

RESEARCH METHODOLOGY

Survey Procedure

There are no directly applicable questionnaires for this study. The current survey questionnaire is built by combining two well-established questionnaires. The first is the Patterns of Adaptive Learning Survey (PALS) (Midgley et al., 1996). It is a widely adopted scale in research related to motivation and beliefs. The second questionnaire on learner autonomy is adapted from a study on autonomy (Spratt et al., 2002), which would cover constructs including relatedness and competence in its list. All survey questions were written and distributed in Chinese. Selected questions from the questionnaire can be found in the Appendix; each item is measured in a five-point Likert scale (Likert, 1932).

Once the questionnaire was initially drafted, a bogus question, that is, a question paraphrased from an existing question, was added to the questionnaire. The answer to both questions ought to be the same. After that, trusted pilot partners were invited to fill out the form to test the completion range, indicating that a carefully filled-out questionnaire would typically take 60 to 120 seconds. Based on the above two settings, any responses that do not have the same answer for the two bogus questions or were completed within 60 seconds would be removed from the dataset during preprocessing.

Student WeChat groups were initially the leading distribution channel in the response collection process. However, the results could have been better, given that more than half of the responses were immediately removed before further in-depth analysis. Five additional online distribution service providers were approached, and only one out of five could deliver high-quality responses consistently. Of the 107 responses eventually included in this study, 70 samples have come from this online distribution channel. The other 37 samples have been collected by approaching friends who have completed undergraduate study. The two tricks (completion time and bogus questions) showed that online distribution channels should be used cautiously and are meant to provide an effective way to screen distribution channels in future studies when distribution channels are limited.

Reliability

After preliminary preprocessing, communality and Cronbach Alpha of items within each construct were calculated. Many thresholds have been proposed for the cutoff of communality, and the ideal threshold adopted is 0.5 for sufficient explanatory power (Hair et al., 2019, p. 155). Cronbach Alpha is a reliability measure that reflects internal consistency (Cronbach, 1951). The threshold used is 0.7 or above to indicate the homogeneity of items (Cortina, 1993). As seen in Table 2, all communalities are greater than 0.5, and all Cronbach Alpha are greater than 0.7.

Table 2. Communality and Cronbach Alpha of Each Construct

	Motivation	Autonomy	Competence	Relatedness
1	0.620 (q4)	0.557 (q7)	0.703 (q10)	0.743 (q13)
2	0.694 (q5)	0.677 (q8)	0.690 (q11)	0.709 (q14)
3	0.569 (q6)	0.720 (q9)	0.610 (q12)	0.765 (q15)
Alpha	0.700	0.732	0.749	0.819

RESULTS AND DISCUSSION

Demographic Profile and Descriptive Statistics

For this survey response sample (Table 3), all students are from China, and 90.7% of respondents are between the ages of 22 and 30. In terms of major, 51.4% of students majored in social science. Regarding GPA, most students scored between 3 and 3.7 from an olive-shaped distribution typically seen.

Table 3. Demographic Profile of Survey Respondents

		Frequency	Percent (%)
Gender	**Male**	32	29.9
	Female	75	70.1
Age	**18-30**	97	90.7
	>30	10	9.3
GPA	**<3**	4	3.7
	3-3.7	64	59.8

	>3.7	39	36.4
Major	**STEM**	34	31.8
	Social Science	55	51.4
	Business	18	16.8

The descriptive statistics of the collected sample can be found below, see Table 4. In this sample, the mean of students' intrinsic motivation is 4.13 on a Likert Scale. Relatedness has the highest standard deviation of 0.82 and the lowest mean of 3.15 among all constructs.

Table 4. Descriptive Statistics of Key Constructs

	Mean	**Std**	**Min**	**Max**	**Median**
Motivation	4.13	0.59	1.67	5.00	4.33
Autonomy	3.81	0.67	1.00	5.00	4
Competence	3.65	0.59	1.00	5.00	3.67
Relatedness	3.15	0.82	1.00	4.67	3

Correlation Test Results

In the first step of the analysis, as a preparation for subsequent analysis, a simple correlation test confirms the general applicability of self-determination theory. The numerical value of each construct is computed by averaging the responses of the three questions under the respective construct. As shown in Table 5, intrinsic motivation is shown on 0.05 level to be significantly correlated with all three constructs as predicted by the self-determination theory.

Table 5. Correlation Test on Survey Responses

	1	**2**	**3**	**4**
1. Intrinsic Motivation	-			
2. Autonomy	0.280**	-		
3. Competence	0.231*	0.135	-	
4. Relatedness	0.339**	0.346**	0.640**	-

Mediation Analysis Results

In the second step, consider the observation on high-stakes testing and the model developed for this study, PROCESS macro (Hayes, 2013, p. 445), particularly Model Four, is used to test the mediation effect of relatedness on the relationship between autonomy and motivation and the relationship between competence and motivation. The purpose of choosing mediation analysis is that it unravels the "black box" (Hafeman, 2009) by explaining "why" autonomy and competence would lead to enhanced intrinsic motivation (Hair et al., 2019, p. 407). As previously reviewed, years of research have found adding a fourth construct unnecessary. Therefore, the assumption of no hidden variable necessary for mediation analysis is satisfied.

The first part of the mediation analysis focuses on autonomy and motivation as mediated by relatedness. Results in Figure 2 found that the direct effect of autonomy on motivation is insignificant ($p = 0.058$). However, its indirect effect is significant with the lower bound in the output greater than 0, see Table 6. Therefore, it can be concluded that relatedness completely mediates the relationship between autonomy and motivation (Hair et al., 2019, p. 408). It is easy to reconcile the decomposition by calculating 0.422 ´ 0.198 + 0.162 = 0.246.

Table 6. PROCESS output of Mediation Analysis on Autonomy, Competence, and Intrinsic Motivation

AT-MT	**Effect**	**se**	**t**	**p**	**LLCI**	**ULCI**	**c_cs**
Total	0.246	0.082	2.99	0.003	0.083	0.409	0.280
Direct	0.162	0.085	1.913	0.058	-0.006	0.331	0.185
Indirect	0.084	0.049			0.007	0.192	
CP-MT	**Effect**	**se**	**t**	**p**	**LLCI**	**ULCI**	**c_cs**
Total	0.229	0.094	2.427	0.017	0.042	0.416	0.231
Direct	0.023	0.119	0.193	0.847	-0.214	0.260	0.023
Indirect	0.206	0.095			0.034	0.399	

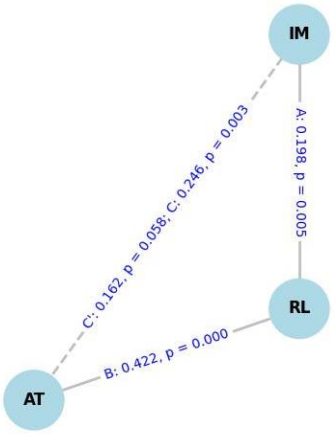

Figure 2. Mediation Effect of Relatedness on Autonomy and Motivation

The second analysis shown in Figure 3 shows that the direct effect of competence on motivation is insignificant (p = 0.847). However, its indirect effect is significant with the lower bound in the output greater than 0 (Table 6). Therefore, it can be concluded that relatedness completely mediates the relationship between competence and motivation (Hair et al., 2019, p. 408). This decomposition can be numerically reconciled by computing 0.023 + 0.881 ´ 0.234 = 0.23. In addition, the effect of competence on motivation is shown to be mainly realized through the indirect part (0.206 / 0.23 = 89.6%).

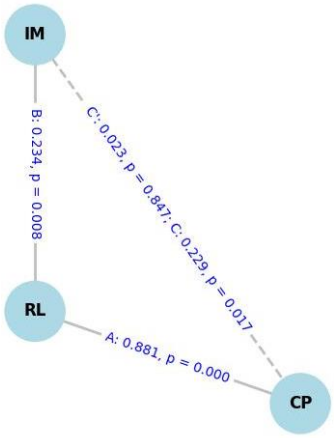

Figure 3. Mediation Effect of Relatedness on Competence and Motivation

The results above can be interpreted together as follows: when students increase their competence and autonomy if the relatedness is not allowed to follow its natural path of development, intrinsic motivation in its stable state would tend to remain low (Anderson, 1976) as grades take over as external locus of causality. Suppose that the students, for various reasons, are severely restricted in relatedness, given sufficient autonomy (but not likely competence); intrinsic motivation may still exist where students do not perceive the locus of causality as being completely external. It is worth clarifying that the choice here is distinct from the "what" type of choice provided to support autonomy (Niemiec & Ryan, 2009); instead, it is the "why" in psychological perception. This built-in nondeterministic aspect rooted in attributional search (deCharm,1983) would make the proposed theory robust.
To extend this line of reasoning, when students have become solely pressured by grades and relatedness brings nothing but negativity (e.g., peer pressure), the proposed theory in this study will not deny intrinsic motivation in classroom learning because students are still given choices, which by definition is autonomy orientated (Deci & Ryan, 1985, p. 154). This would shed light on those who, for irresistible reasons, remain in high-stakes testing scenarios and keep researchers alert and cautious because intrinsic motivation under the theory of this study could, in the worst cases, return to ruthless competitive behavior.

Overall, using the SPSS PROCESS macro, the mediation analysis results support the hypothesized model presented in Figure 1.

Discussion

The practical implication for universities is to return to their fundamental mission: to help students develop an appreciation for the pleasure of learning. Hopefully, that will last for a life span (Ryan et al., 2019). Higher education, in this sense, provides invaluable opportunities for students to experience self-regulation, practical action, and cooperation, which are crucial attributes of thriving in social organization (Ryan et al., 2019). However, due to the previous prediction that an intrinsic motivation created by a choice made between two external motivations could lead to undesirable behavior, it will be worthwhile efforts, even in higher education, to continue to emphasize providing value and goals guidance (Wigfield, 2019).

On an operation level, instructors and administrators shall provide sufficient opportunity for students to generate such relatedness (Beachboard et al., 2011) and facilitate conflict resolution whenever necessary. This emphasis on relatedness enables new interpretations of existing best practices. For example, some universities recommend that instructors and teaching assistants provide feedback within ten days of submission, define clear grading criteria in the assignment documents, and post sample responses afterward. The recommended practices give the troubled students a choice to move away from intentional manipulation of scores in low transparency environment (Ryan & Brown, 2005) and replace it with the perception of an opportunity to exchange with instructors' informational constructive feedback necessary for the internationalization of self-regulation (Koestner et al., 1984). Another good example would be that in recent years, more instructors have been using Canvas (Aldiab, 2019) to encourage students to answer each other's questions. Instead of questioning their competence when encountering difficult questions (Elliot et al., 2011), students will understand that others may have the same question, thus alleviating self-doubt.

CONCLUSION

One interesting analogy of this study on relatedness in education is the manufacturing of white bread by Wonder Bread. Adding various combinations of nutrients to the notorious white bread brought the brand's popularity among consumers (Ryan & Powelson, 1991). In the survey, the complete mediation effect of relatedness on the relationship between autonomy, competence, and intrinsic motivation is the empirical evidence of the self-determination theory, its closed related mini theories, and the nifty idea of choice.

In the future, on a theoretical level, research for thoroughly understanding the relationship between competence and relatedness is rare. However, it would be meaningful to explore the underlying mechanism further. For example, when students are highly competent, their satisfaction with relatedness may be suppressed by the perception that peer's actions will become an obstacle to one's own goal (Johnson, 2009) or teachers and parents are exerting a controlling type of relatedness (Deci et al., 1991).

Practically, teachers shall remain conservatively optimistic about the potential of practices that generate relatedness among students. Besides the reasons explained earlier, free riders may push students back to individual study after completing the project (Hall & Buzwell, 2013). In such situations, research should help reduce the negative occurrence by identifying triggers and designing proper policies early on.

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Teacher Perspective's Crisis Management Applied in the Syrian Crisis

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ABSTRACT
In education, natural disasters, management of domestic and foreign policies of states, and solutions to problems that arise in organisational institutions constitute a wide range. Crises can be partially eliminated, or their adverse effects can be reduced with appropriate risk management and planning thanks to planned crisis management and effective target-oriented education. The subject of "Crisis Management" has developed worldwide and has increasingly gained importance in teaching the most effective management of the crisis process in political, social and security areas. In this study, the methods, tools and practices regarding crisis management applied in the Syrian crisis, which started in the Middle East in 2010 and grew with the refugee problem in Turkey and all over the world and turned into a hot war with the effect of the Arab Spring, which also brought socio-economic issues and the methods, tools and practices applied in Syria, Turkey's close neighbour located on the southern border, were examined. Inferences and solution suggestions regarding teaching effective crisis management and communication are presented in the study's findings.
Keywords: Crisis; Teaching, Crisis Management; Syria; Turkey

INTRODUCTION

A crisis is an unexpected and undesirable emergency that a business or individual encounters (TDK, 2023). The term crisis, commonly used to describe the challenges faced by economic structures, has recently been incorporated into public relations literature. In order to minimize the damage caused by a crisis and restore the organization's image to its pre-crisis state, management must first identify the key issues that contributed to the crisis and then promptly communicate and take action. In a crisis, the role of public relations becomes more crucial than ever. Developing strategies to respond swiftly and implementing them is particularly vital in crisis management.

It is obvious how important public relations has become in crises and how much organisation managers focus on public relations research becomes essential. These factors also include what results organisations can achieve if they deliberately respond to a crisis in the field and how they can be affected if unprepared. Among all these possibilities, the question of whether the solution to the situation will be an opportunity for countries or whether the consequences will be a disaster and the solution of the crisis to be put forward is of vital importance.

In this study, the operation of crisis management practices within the scope of public relations will be questioned, using the example of the Syrian crisis. With the effect of the Arab Spring that started in the Middle East in 2010, the protests that began in March 2011 in Syria, Turkey's close neighbour on the southern border, turned into violent actions in a short time, and a civil war started in the country. Methods, tools and practices related to public relations will be investigated and examined in the crisis management issues and issues applied in the Syrian crisis, which has turned into a hot war in the Middle East and has grown with the refugee problem in Turkey and all over the world, bringing with it socio-economic issues. A conclusion will be reached about effective crisis management and communication. Based on the results and solution proposals to be reached, suggestions that can be used in crisis management, communication and political communication, which are the subject of public relations, will be presented.

This crisis, whose effects are very closely related to our country, has had many military, social, political, and cultural consequences. These consequences have spread from mass migrations to border conflicts, from international crises to various embargoes and sanctions. In this study, these ongoing effects were examined, and possible future consequences were tried to be revealed.

CRISIS AND CRISIS MANAGEMENT

Kernisky describes the crisis as a significant mismatch between the expectations of an organisation and what is happening around it (Kernisky, 1997, p. 843). Many factors contribute to the formation of a crisis. A crisis is an unexpected situation that develops suddenly, moves quickly and is faced without any preparation. It can mean collapse if it is not well evaluated for the organisation and an opportunity if it is evaluated well. A crisis, also known as a strategic turning point, can be a situation in which the pillars of business life change, and this moment signals new opportunities or the beginning of the end (Grove, 1997, p. 4).

All organisations worldwide have one thing in common: They constantly look for new ways to do things. Organisations change over time, and adapting to this change will help the organisation overcome what could be a critical transition point. Crisis management is defined as the ability to anticipate, prevent, or respond to potential problems when they arise rather than taking action to limit their consequences (Mackenzie, 1995, pp. 73-77).

On the other hand, it has been stated that crisis management is necessary not to harm the organisation's image or the communication with the target audience (Paksoy, 1997, p. 47). In terms of public relations, in a sense, crisis management is defined as the struggle to turn a difficulty, disaster or problem into an opportunity (Arıcı, 2001, p. 2). If managed well, a crisis is an opportunity. In a crisis environment, if opportunities are not used enough, it leaves the environment and society hesitant and undermines trust in the organisation. In many organisations, the scale and nature of the impact of crises will vary. Crisis management is like a hurricane that swallows everything and leaves nothing in its way. Nerves are tense, everyone is ready to get angry, and essential work can be postponed (Mackenzie, 1995, p. 72). In crisis management, managing a crisis successfully and effectively is possible with a crisis plan and team. For a well-prepared, qualified and experienced manager, crisis management cannot go beyond ordinary administrative issues. This brings severe success and comfort (Peker-Aytürk, 2000, p. 386).

Crisis communication, on the other hand, has an essential place in managing the crisis correctly and effectively, informing the public, eliminating the panic environment, and expressing itself in the institution. It is necessary to be able to respond in a timely and satisfactory manner. In this respect, it has a significant role in crisis management. Crisis management has many unique features that distinguish it from traditional management approaches. The primary purpose of crisis management is to predict crises, determine their types, take precautions against crises, learn from crises in many areas, and create an organisation that can recover as soon as possible (Pearson-Mitroff, 1993, p. 49).

The main features of a successful crisis management can be listed as follows (Haşit, 2000, p. 66-67):
- The foresight of people who manage crises is essential in crisis management. The success of crisis prevention depends on how leaders perceive the situation.
Continuous crisis management is essential. There is no before-and-after. It's always good practice to test and review plans for foreseeable crises.

Crisis management should be established according to the type of crisis that occurs. Every crisis has its own symptoms and solutions, and solving one makes another inevitable.
Successful crisis management can have enormous rewards. By managing crises well, crisis management can increase management confidence and morale. Managers who successfully emerge from a crisis start new career stages.

- Coping with crises involves a critical, necessary, challenging, and complex process. Therefore, one should not expect a quick resolution of the situation. This is a long, difficult road. Resolving crises requires flexible and creative thinking, impartiality, courage, teamwork, always being ready, open to innovations, and prepared for unexpected demands and situations.
- Crisis management has critical elements such as communication, control, cost, culture, regulation, contingency planning, system complexity, and interdependencies. These factors constitute an organisation's recipe for crises and are critical to managing and resolving crises through corporate values and beliefs.
- The central systems and response strategies in crisis communication management are varied.

On the other hand, in times of crisis, public relations is of primary importance for an organisation, and a system in place that can anticipate an impending crisis, use crises in favour of the organisation, and give a new impetus to company processes is a more valuable and sought-after feature. The systems that come into play after the crisis comes to a head should be abandoned (Tüz, 2001, p. 26). Crisis management is an environment that requires the management of the entire organisation with public relations. A crisis should not devastate an organisation because it is part of an organisation and constantly interacts with its environment. Although eliminating them does not

always seem possible, it is possible to keep them at an optimum level and overcome the crisis by using public relations measures that do not harm the organisation (Şimşek, 1999, p. 316).

Public relations departments cannot predict crises in advance but must identify potential problems and weaknesses. Opportunities should be grouped in order of priority, and questions, answers, and solutions should be created for each possible crisis scenario. Once the strategy is developed, management must be informed, a description of the crisis must be developed, and public relations must manage it to help plan the media response (Görpe, 2001, p. 28).

The main intervention strategies of public relations in crisis management are as follows (Peker-Aytürk, 2000, p. 389):

Precautionary Strategy: This strategy is used by agencies before the first rebuttal to create a crisis. An example can be set up to prove them wrong in advance.
- Aggressive Response Strategy: This institution has established itself as a crisis powerhouse. Examples include aggression, embarrassment, shock, and threats.
- Defensive Intervention Strategy: The side in danger is less aggressive. Examples include denial, apology, and exemption.

Distracting Communication Strategies: These aim to distract the public's reaction and keep eyes away from the facility. Examples of this include reconciliation, sociability, indifference, and name changes.
Strategies for Expressing Semi-Audibly: This is an attempt to show empathy, reduce the public reaction as much as possible, and openly admit guilt. Examples of expressions of concern, condolence, regret, and apology can be given.

Corrective Action Strategy: This strategy consists of actions taken to repair damage to the target group, such as investigation, corrective action, compensation, etc.
- Strategic Inaction: There is no comment on the development of the event. For example, silence can be treated as a case, and the crisis or problem can be solved and forgotten without being mentioned too much.

Stages and Effects of the Crisis Process

The first stage is pre-crisis public relations work, pre-crisis preparation within organisations, and developing contingency plans prepared by crisis management to face a crisis. The task of public relations is to ensure that an organisation is sensitive to crises through various activities and that crises are overcome unharmed if they arise. It should be recommended that a study on the organisation's activities be prepared to facilitate the detection of possible crises that may occur in the organisation and the problems that may cause crises in the future. In the preparatory phase, which includes pre-crisis public relations research, an organisation should first define a crisis, review its relationship with the external environment, and create a crisis management team to intervene (Üzün, 2000, p. 25).

In the second stage, the crisis management team should be formed. While creating this team, care should be taken to recruit knowledgeable, persistent and hardworking people willing to take risks. The first pillar of these activities is the appointment of a crisis spokesperson for the channels through which the messages to be conveyed in the event of a crisis will be conveyed and for the crisis unit, which should give a single voice primarily for the transmission of information about the crisis (Genç, 1996, p. 193). The crisis management team leader is the top management level of the organisation. The Public Relations Manager is the lead consultant. The other members are the heads of departments such as production, human resources, marketing, etc. If the manager who manages the team feels that the team is lacking, he can appoint consultants from outside the institution (Budak-Budak, 1998, p. 252). Managers work by advising and guiding the organisation's employees. If necessary, they also create an opportunity to learn from them and benefit from their knowledge. This will help everyone work together as a team and overcome challenges. An effective communication system should always be considered. It should also be regarded as a qualified crisis management team dedicated to organisational activities and with appropriate capacity and decision-making authority (Deming, 1996, p. 97).

Concepts such as Crisis Room, War Room or Situation Room are primarily encountered in political crises. A crisis room is a symbol of collective wisdom, symbolising bringing together all the energy and resources of an organisation to solve a problem. In case of any crisis, all relevant information flows here, and this information is immediately evaluated, necessary decisions are made, and essential strategies are developed. Crisis room management ensures that all information is collected in the exact centre, instantly assessed, and decisions are made together with the management and acted accordingly (Tüz, 2001, p. 10).

For this purpose, the following measures should be taken to establish an effective communication system in crisis management (Peker-Aytürk, 2000, p. 394):
- There should be an adequate flow of information within the organisation.
- The list of people and organisations to be contacted in case of crisis should be updated.

A press centre should be established so the press and media representatives can continuously benefit from it. The press should be provided with necessary support services.

The Crisis Center Coordination Body should have a Press and Public Relations Office that is open to the press and the public for a certain period of time. At the same time, as the spokesperson of the Crisis Management Team, the Head of Press and Public Relations should inform the press and the public and make statements on behalf of the facility.
- Crisis management decisions should be communicated to stakeholders first.
- Be realistic and acquire the ability to quickly make an enlightening statement, especially against exaggerated, inaccurate, unrealistic, demoralising, aggressive, panic-inducing, fear-inducing, destructive gossip, information and news.

In the third stage, the planning phase, it is essential to analyse each organisation to develop a plan to achieve the most successful outcome throughout the crises. Even if they don't achieve the financial success they need, these efforts are jeopardised in the long run if the plan goes awry. An effective communication plan is required to get results (Çöklü, 1994, p. 324). Therefore, when developing a plan, it is helpful to start with a general definition of crisis management to provide a general framework. During the preparation, care should be taken to ensure that the contingency plan has the following characteristics (Emrealp, 1993, p. 29): It should be concretely formulated, accessible, measurable, time limits should be shown, priority should be, and existing restrictions should be clearly stated. For a crisis plan to be defined, a crisis management unit must have a crisis communication plan that can be implemented during a crisis, but its use is not mandatory. A crisis communication plan is about preparing before the storm. This plan cannot fit into a specific scheme and may change as the crisis develops, so it needs to be constantly updated. It also means the preparation of an overall crisis communication strategy. When creating a crisis plan, all options should be determined in writing at the outset to overcome the crisis with the least possible damage. In addition, the coping capacity of the institution should be assessed using objective tools. It is necessary to take measures to prevent a crisis (Çamdereli, 2000, p. 126). It is essential and efficient to have a prepared crisis plan ready and to test and implement the plan prepared by the crisis management team. If properly organised by the crisis team leader, the crisis plan becomes a dynamic and educational experience for the team members at this stage. Once the plan is implemented, the crisis management team tries to determine which crises we will face in the next few years (Göztaş, 1997, p. 45).

Crisis Management and Its Features

Principles of Crisis Management: Crisis management is not about avoiding or resolving crises but about preventing crises or turning crises into successes. However, in the fight against crises originating from outside the organisation due to unforeseen environmental factors and natural, political, economic, and technical reasons, the necessary administrative and rational measures are taken to manage them effectively. Compliance plays a crucial role in crisis management. Organisations need leadership to overcome crises and turn them into opportunities (Peker-Aytürk, 2000, p. 385-386).

Saffir-Tarrand also summarises and evaluates the seven crisis management principles that emerge when dealing with organisational crises and gives the following recommendations (Saffir-Tarrand, 1993, pp. 86-88):

A crisis management team responsible for day-to-day tasks should be formed to focus on problems. The crisis management team should centralise and control the flow of information. The speakers should be chosen carefully and use expressions that will not exacerbate the problem. Only selected and well-prepared speakers should inform the media. Spokespersons should work on the image and image strategy of the evolving organisation.
- An appropriate strategy should be defined for the worst-case scenario.
- Focus on content under pressure. The media needs to present the issue accurately.
- Potential allies should be identified, national and special groups should be established to work with in times of crisis, and support groups should be established.
- A comprehensive crisis action plan should be developed. This plan should be distributed to all stakeholders. New members should be explained to contingency plans when they join the team. A well-crafted action plan should include policy reports consulted in times of crisis, a complete list of emergencies that may occur, a list of critical listeners and appreciation groups with monitoring of opposing groups, contingency plan resource analysis, a list of crisis management team members, and periodic crisis surveys.

The Importance of Public Relations and Media in Crisis Communication and Management

In crisis communication, it is essential to establish a sustainable and trust-based relationship with the environment while overcoming crises. Although it seems impossible to eliminate environmental interaction issues, it is also possible to keep them at optimal levels and reduce them to a size that will not harm the organisation with a strategic crisis communication approach (Şimşek, 1999, p. 316). The development and diversification of the mass media are both beneficial and dangerous, mainly due to the enrichment of new media, which is added to the traditional media and tends to increase, and the rapid dissemination of accompanying information such as ideas, comments, news, etc. New media includes websites, social networks, forums, blogs, and online chats. It also contains rooms, web dictionaries, and more. A crisis that arises or develops in this environment also poses a threat to businesses and institutions. This is especially true in a virtual environment that is free from property issues, agnostic to the spiral of advertiser/publisher relations, and more accessible than traditional mass media, especially in virtual environments that allow the use of pseudonyms (Göztaş, 1997, p. 59-60). Threats from virtual environments can infect millions of people within hours or minutes, and businesses need to quickly find the correct answers and implement them without waiting to protect their reputations (Er, 2008, p. 153).

In new media crises, which are accepted as the basic principle of crisis management approaches today, the necessity of developing the ability to predict and eliminate possible problems with good observation skills and to take steps to solve potential issues without underestimating them is also increasing. An email from several people, a new discussion on social media, or a seemingly inconsequential blog post can become a giant avalanche caused by a small snowball rolling down a mountain. To avoid falling into an avalanche in a crisis that draws the media's and stakeholders' attention to an organisation, the most crucial step is to ensure a healthy and sustainable production and flow of information. Organisations should meticulously organise the time and coordination of those involved in crisis communication to provide adequate information flow in unpredictable, sudden and reputational crises (Peltekoğlu, 1998, p. 452).

In crisis management, public relations can use new media tools to express the consequences of the crisis and create an environment where they can be conveyed to the public and the organisation's target audience through the press (Pertekor, 1998, p. 242). Communication with the media brings significant benefits to an organisation. We can list these benefits as follows (Fink, 1986, p. 109):

- Working with the media makes organisations active rather than passive.
- Organizations have more time to control and deliver messages sent.

Organisations have more opportunities to correct misinformation than if they were not dependent on the media, i.e., if there were no communications.

- Failure to communicate with the media indicates that the organisation has not significantly impacted the crisis.

AN EXAMPLE OF CRISIS MANAGEMENT WITH COMMUNICATION AND PUBLIC RELATIONS: SYRIAN CRISIS

In the study, literature information, field news, media news about the Syrian crisis and published expert reports were generally used. Unrefuted news (embraced journalism), or news that many media outlets have confirmed, has been accepted as accurate. As definitions, the institutions recognised by Turkey in the international arena are taken as a basis, and their official names are used. The statements and declarations of the structures identified as terrorist organisations were not respected. In the same way, in terms of borders and the authorities that govern those borders, the borders and authorities recognised by official institutions are assumed to be correct and valid.

The research is limited to the sources reached. It is only possible to receive news from the front of a civil war and the environment in which it is experienced to provide information and statistics through intermediaries. Only the example of Syria and the news coming from this field have been credited through prestigious sources. The articles published by leading academics and academic publications on this subject have been considered in crisis management. Crisis management has been limited to the Syrian civil war and its effects, and no comparison has been made with the crises and wars currently taking place in other parts of the world.

Historical Process in the Syrian Crisis

A mass movement that began in the Middle East in late 2010 can be defined as demanding a democratic regime in which people oppressed by oppressive and authoritarian governments can have a more significant say in governing their countries. This context has been used by various names on social media and by researchers interested in the subject. These movements are the Arab Awakening, the Arab Spring, and the Arab Revolt. The Arab Spring is the most used (Doğan and Durgun, 2012, p. 62).

Syria, which gained its independence after France withdrew from Syrian territory in 1946, was subjected to military coups in the 1950s and 1960s and dragged the country into internal instability. A military coup in 1963 brought to

power the Ba'ath Party, which advocated Arab nationalism, and Hafez al-Assad became president in 1971 with the support of the notables and the bourgeoisie. Hafez al-Assad transformed the country into a democratic authoritarian structure for 40 years from that day until he died in 2000 (Şen, 2013, p. 57). It should be remembered that the impact of the series of dictatorships that started with the French mandate in Syria on the people has had the most significant impact on today's issues. France's separation of the country into various minorities with autonomy and other privileges has caused many problems. Chief among these is the conflict between Alawites and Sunnis. As for the majority of the Sunni population, the Alevis, who are a predominantly agricultural minority in the western part of the country, have gained severe cadres in the armed security forces (Özdemir, 2016, p. 83). In Syria, where the Baath Party is in power, the people are stunned by "emergencies" such as corruption, unequal income distribution, limited freedom of the press and expression, torture, and a deteriorating domestic climate. For this reason, the people started to protest the government (Hediye, 2012, p. 31). A process similar to what the region's countries witnessed at the beginning of these demonstrations has encouraged the Syrian people. The uprising, which started on March 15, 2011, in Daraa in southern Syria, gradually spread throughout the country. Those overwhelmed by the pressure of the Assad regime started protest actions (Dalacoura, 2012, p. 66). In the meantime, Turkey has been greatly affected by the Syrian crisis because it is both a Muslim and a neighbouring state and the existence of a deep historical relationship.

The Syrian Crisis for Turkey

Before the Arab Spring, Turkey-Syria relations were perhaps at the best level in history. The policy of Syria, which experienced the Arab Spring, against the people was of great importance for itself and the Middle East. Syria is Turkey's border neighbour, and Turkey first started to follow a wait-and-see policy towards Syria in order not to repeat the contradictory policies implemented in Libya (Oğuzlu, 2012, p. 53). In August 2011, Foreign Minister Ahmet Davutoglu visited Damascus and expressed his desire to achieve democratisation in Syria. After these meetings, it was stated that with the increase in violence in Syria, there may be a Turkish military intervention in Syria (Akbaş, 2012: 67). However, Turkey challenged these Western discourses by emphasising that Bashar al-Assad should implement reforms and solve the problem peacefully (Kibaroğlu, 2012, p. 32). When these demands failed, Ankara changed its Syria policy and allowed the refugees fleeing its territory to live within its borders. In addition, in June 2012, a Turkish Air Force fighter jet was shot down over the Mediterranean coast of Syria. In October 2012, five people were killed in bombs dropped by Assad's forces in the Akçakale district of Sanliurfa. Thereupon, Turkey changed its policy sharply. As a result, Turkey, which exhibited moderate bilateral relations with the Syrian regime in the early stages of the popular uprising in Syria, experienced a severe political change in this process, which led to the direct support of the opposition against the regime. Kaman says, "This change is not a transition but a final break." The situation has turned into a grave refugee crisis on a national and public basis, mainly for which a permanent solution has not been found (Balcı, 2013: 307-308). Communication and public relations are also essential elements in crisis management, which are strategically applied by states in creating political solutions to the Syrian problem.

Communication and Public Relations in the Syria Crisis

Due to the communication tools that have become widespread within the Communication and Public Relations discipline, the media has emerged as a new and effective power. The power of the media in crisis management, which is the subject of this article, is an undeniable reality (Cote, 2022, p. 23). Social media plays a vital role in the Syrian uprising in that these social media channels help organise, communicate and develop demands and statuses among protesters. The Arab uprising has drastically changed how we view social media and deal with it. Many scientists think that social media such as Twitter, YouTube, and Facebook are not just tools for socialising, organising, and talking about birthday parties. Around the world, social media is becoming an agent of change, playing a public and political role in organising the social movement. Social media also plays a vital role in covering and communicating news worldwide. The role of social media in the Middle East is even more critical because it creates a platform for discussion where there is no absolute truth. Social media played a crucial role in shaping the political debate in the Arab Spring. Online political chats preceded the main events on the ground. Social media has also helped spread democratic ideas in the Arab world. Social media channels such as Facebook and Twitter have become some of the most powerful tools of revolution that convey people's demands for freedom, transparency, justice, and a freely elected government. Social media has played a role in the Syrian uprising in that these social media channels have helped to organise, communicate, and develop demands and status among the protesters.

Debates about the power and potential of new media in shaping society are divided between scholars such as La Jeunesse and Echikson (2013, p. 52), who see social media as a tool for democratic openness, and those who emphasise controlling, such as Howard and Hussain (2011, p. 38). Even in democratic countries, some authors believe that new technology threatens citizens' freedom and privacy. Other scholars have become attracted to the

potential role of new media in shaping politics by opening up a new platform for debate, especially in societies without a natural platform for public discussion (Howard and Hussain, 2011, p. 38).

However, some authors, such as Khandker, have offered a more balanced view of the potential and pitfalls of new media's liberating and controlling role. International managers and experts who actively use crisis management believe that social media plays a significant and vital role in organising and promoting social movements. The increase in the power of new media over traditional media has made it more powerful. However, traditional media has undoubtedly played a significant role in presenting the Syrian uprising to the global community, which has broadly supported the libertarian transition. In addition, the political leaders of these Middle Eastern countries who witnessed the uprising had foreseen this situation. With or without social networks, Tunisia, Egypt, Libya, Syria, Yemen and Bahrain were ready for revolutionary movements due to various political-economic conditions. Similarly, it was unknown to what extent these revolutions would be successful and whether social networks could be supported (Khandker, 2015, p. 667).

The internet played an essential role in the developments with the effect of the Arab Spring during the Bashar al-Assad period. During the Assad government, the Internet was introduced to Syria in 2001. However, access to social media apps such as Facebook and YouTube is officially banned. The civil war has made the Internet controversial among politicians (Howard & Hussain, 2011, p. 38). Opposition actors claimed that Assad was monitoring videos and messages on the internet in real-time. In some cases, it has also been argued that they obtained confidential state secrets via the Internet to warn their colleagues in Damascus of the regime's actions against them. The pro-government Syrian Electronic Army has also been accused of DDoS attacks, phishing scams, and fighting opposition activists online. Assad's forces examined laptops at checkpoints for software, allowing users to bypass government spyware (Chozick, 2012, p. 24).

In the Syrian Civil War, the public relations efforts of third parties, such as the United States or Turkey, were carried out intensively. Because the governments of these countries have resorted to such practices to strengthen their Syria policy in their own countries and to gather supporters. As President Obama sought congressional approval for a military strike on Syria for allegedly using chemical weapons against his people, the Daily's Matt Wilson said the vote in the Senate and House of Representatives was like "walking a tightrope." As U.S. pressure for military action in Syria has increased, special interest groups have emerged as a public relations response. Groups such as the Syrian Progress Institute financed ads in publications such as the Washington Post, which featured an image of children allegedly victims of a chemical weapons attack. Thus, it was declared that "America's credibility and national interests are in danger" in the military authorisation vote, which was approached as a public communication strategy using the media (Gurcan, 2012, p. 99-138).

Syrian President Bashar al-Assad has also started using various social media features to clean up his negative image. His experts, advising Assad, created an official Instagram account for the "Syrian Presidency" to the president. The account portrays Assad in various positive poses. As a working young man, he is intertwined with the people and even the image of a leader whose wife is doing charity work in Syria. However, it does not seem to have achieved the desired result. Patrick Coffee of PR Newser said, "Most Instagram users have had the opportunity to let Assad know exactly how they feel in the comments, often including the word "go to hell" and other less nasty profanities (Habertürk, 2013).

Crisis management has been a method that has been applied very frequently in Turkey during the Syrian crisis, both out of necessity and out of necessity. Both the refugees taken, terrorist acts and cross-border operations have created many crisis management experiences. At this point, the Presidential Communications Department and similar public institutions, established by Presidential Decree No. 14, published in the Official Gazette dated July 24, 2018, and numbered 30488, took steps and played a leading role in crisis management. Many crisis management steps have been taken, from aid organisations to refugee camps, from press releases to policy measures when necessary. In addition, the state's contribution to crisis management has been seen through channels called new media. In the same way, a great public opinion study was carried out for operations such as Euphrates Shield and Peace Spring, and the support of the people was provided through media campaigns. They organised magnificent martyrs' funerals, and many experts appeared on TV and emphasised the necessity of operations.

Although there are approximately 3.3 million Syrian refugees in Turkey, the presence of 233 thousand asylum seekers in accommodation centres is a severe situation assessment. This situation shows that more than 92% of Syrian refugees live in different parts of the country in an uncontrolled and dispersed manner. Syrians see Accommodation Centres as a last resort due to their various limitations and inadequacies, and the immigrants who settle in multiple cities are the source of economic, administrative, social, cultural and spatial multidimensional problems. We know that some of those who came from Syria also have the status of Turkish citizens. Due to the

deficiencies in the official documents of many Syrians who came to Turkey, reliable information about those who came to Turkey cannot be reached (AFAD, 2014, p. 16). It is known that 3.3 million Syrian refugees, who are scattered uncontrollably in our country, will be the source of both security and new economic, social and cultural problems. To take precautions in this regard, first of all, it is necessary to know where under what conditions and for how long the target group (3.3 million Syrian refugees) has been living in the country.

CONCLUSION

The Syrian crisis emerged as the most important result of the Arab uprisings. The peaceful protests that erupted in Syria in March 2011 have since escalated into the world's most complex conflict. Syria's multi-layered conflict encompasses a rivalry between the United States and Russia, regional wars of teaching, and military great power competition. The conflict also involves a plethora of powerful non-state actors, ranging from Sunni jihadist groups such as the Islamic State group (ISIS) and al-Qaeda to openly secular Kurdish fighters. The human cost of the conflict is catastrophic and has unleashed the largest migration crisis since the end of World War II. More than half of Syria's population has been displaced, with 6.5 million internally displaced and 5.6 million displaced as refugees. The number of people killed in the conflict has reached 1 million (Dinçer, 2013: 82-95).

The brutality of the conflict, marked by the Assad regime's systematic torture, widespread detentions and disappearances, and routine violations of international norms, including war crimes and crimes against humanity, cannot be underestimated. Syrians are suffering from the worst economic downturn since the start of the civil war, which has added to their misery. As a result of high inflation, the Syrian currency lost two-thirds of its value in 2020, resulting in a lack of necessities and rising poverty rates within the country. According to the World Food Program, 60 per cent of the population had to live without food security (Güven, 2016).

Syria has witnessed a period of relative calm since the Idlib ceasefire negotiated between Turkey and Russia on March 5, 2020. The Syrian Crisis has remained largely static, with no significant military offensives or forced displacements. Yet this predicament is inherently unstable, with many potential flashpoints on the horizon between Israel and Iran, Turkey and the Kurds, and Russia and the United States. Meanwhile, ISIS remains a low-level insurgent but continues to exploit security vacuums in its revival efforts. Southwestern Syria is also unsettled by intermittent anti-regime violence and demonstrations (Anadolu Agency, 2020).

The Syrian Crisis is a significant problem that must be solved for the region and the international community. The first of these is the issue of relocation. The multifaceted displacement crisis provoked by the conflict shows no signs of abating and will likely shape the region's contours in the coming years. Given the hostile environment and large-scale destruction in Syria, Syrian refugees are unlikely to return to their homes anytime soon. A recent Norwegian Refugee Council report states that Syrian refugees are unlikely to return in the next five to ten years. Countries hosting refugees face significant socioeconomic challenges, compounded by pandemic and lockdown measures. Without effective interventions, the prolonged displacement resulting from the Syrian conflict has the potential to lead to a series of crises in nearby host countries with ripple effects towards Europe.

Today, most of the Syrian refugees in the region live in poverty. The prospects are dire for the most vulnerable among them, such as single mothers, children without caregivers, and people with disabilities. More than 90 per cent of Syrians live in extreme poverty, and early marriages are increasing. However, countries hosting refugees, especially Turkey, are taking positive steps, such as allowing refugees to enter the labour market and access public health services. These steps have been achieved despite the many refugees hosted in these countries. Turkey continues to host the world's largest refugee population, including over 3.7 million Syrians, while Lebanon and Jordan are among the countries with the highest number of refugees per capita globally (Dinçer, 2013: 82-95).

Meanwhile, humanitarian needs inside Syria are increasing. More than 6.9 million people are still internally displaced, and 14.6 million people need humanitarian and other forms of assistance. Syria's internal displacement – the highest rate in the world – poses equally troubling challenges. In Idlib, the last stronghold of the rebels, many people had to live in crowded and impoverished conditions. There could also be a significant humanitarian catastrophe with the potential cessation of UN humanitarian aid. People need help providing safe housing, and many still face challenges accessing essential services such as education and healthcare. In 2021, three-quarters of all households in the country said they could not meet their basic needs. This figure is 10% higher than the previous year (Güven, 2016).

However, some Syrians prefer to return home. In 2021, the UN confirmed or monitored the return of close to 36,000 refugees to Syria. Refugees refer to various factors in their decision to return, such as their safety, property rights, and livelihoods. In parallel, many internally displaced Syrians have returned to their homes in addition to their general reintegration needs. As the needs of humanitarian organisations grow inside Syria, they urgently need

the necessary resources to strengthen their work inside the country. In 2022, the UN received seven per cent of the US$465.2 million required for its work in Syria. From Turkey's point of view, the Syrian civil war has turned into a real problem. The cost of the work, the refugee dimension and the military operations that must be carried out require serious financial resources for Turkey. The refugee problem has become a political situation in the country and has become an issue many political parties use in their campaigns. In addition, Turkey needs to manage not only the refugee crisis, whose relations with Western countries have often deteriorated but also the foreign policy and foreign promotion crisis in terms of a crisis management technique. The Syrian crisis is not over yet, and there is no hope that it will end. Therefore, it is still a practical issue in terms of crisis management and will need to be followed with the same seriousness (Oytun: 2014).

Crisis management is not only a concept used in company management but also one of the strategies used to produce solutions in the country's political management. Crisis management is the main characteristic of today's international relations, and its existence can be evidenced by the functioning of its institutions within the framework of certain norms and rules. How these institutionally defined norms, rules and institutions work can be used as a political element in the solution of the Syrian crisis. In the crisis in question, the international community continued to function within the framework of these norms and rules, and institutions such as excellent powers management, diplomacy, international law, and balance of power were operated in order to maintain order. Therefore, today's world must develop a mechanism for world peace that is not only "driven" by conflict and violence but also one of cooperation and solidarity, which can act towards specific goals through its institutions. For this reason, international crises such as the Syrian crisis, which is the subject of this study, can be managed in line with the international community's objectives. In other words, from a normative point of view, states should be operated as the wheels of international politics with shared values/common interests among states instead of mere chaos and conflict for crisis management in international relations. As it is known, while a political structure (today's state or nation-state) monopolizes the power of administration and sanction in the domestic politics of countries, unfortunately, there is no such higher authority in the international community and disorder prevails. In other words, in its simplest terms, international relations are anarchic. However, ideally, strong institutions such as the UN, NATO and the European Union should be able to create order through norms and rules. The most effective and straightforward solution results for crisis management can be obtained by employing these institutions, which are the most critical indicators of the existence of the international community in the Syrian crisis, in a sense, solution-oriented. However, international crisis management should not only be operative in times of crisis, but it should also be essential that all actions in the international arena are used to achieve the ideal social benefit in peacetime. It is also evident that the crisis in Syria is still ongoing and that it cannot be resolved for both Turkey and the world with crisis management. Therefore, it is also possible that the Syrian crisis will result in the supremacy of government forces or the opposition, with or without a humanitarian intervention, or even the emergence of new political structures by dividing Syria into several parts. These and many other possible outcomes not yet listed here are within the scope of international crisis management. For this reason, international crisis management is not an approach that can be applied to limited or specific situations but an approach that tries to understand/explain international relations in general terms.

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The Development of Chinese Learning Achievement by Learning Management through Game-Based Learning for Primary 5 (Grade 5) Students

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Abstract
Game-based learning incorporates game elements into instruction, enhancing its appeal and interactivity. This approach increased students' interest in learning, facilitated more efficient completion of classroom content, and ultimately improved academic performance. The purposes of this study were to: 1) compare Chinese learning achievement before and after learning management through a traditional approach for Primary 5 (Grade 5) students, 2) compare Chinese learning achievement before and after learning management through game-based learning, and 3) compare the Chinese learning achievement by learning management through a traditional approach and game-based learning. The research samples were 60 of the Primary 5 (Grade 5) students, in a Buriram Primary School, Thailand in the 2024 academic year, selected by random cluster sampling. The research instruments were: 1) a learning management plan using a traditional approach; 2) a learning management plan using game-based learning; and 3) a Chinese learning achievement test. The data analysis statistics were mean, standard deviation, and t-test. The results showed that: 1) Chinese learning achievement by learning management through a traditional approach was higher than before at the statistical significance level of .05., 2) Chinese learning achievement by learning management through game-based learning was higher than before at the statistical significance level of .05., and 3) the Chinese learning achievement of those studying by learning management through game-based learning was higher than those studying through a traditional approach at the statistical significance level of .05.
Keywords: traditional approach, game-based learning, Chinese learning achievement

Introduction

Since the implementation of reforms and the policy of opening, China's economic strength has steadily increased, and its international stature has been enhanced. This development sparked widespread interest in China, resulting in a growing number of people wanting to learn the Chinese language. On January 25, 2021, the United Nations World Tourism Organization (UNWTO) made a formal announcement declaring Chinese as the official language of the UNWTO (China Tourism News, 2021). Subsequently, a new trend of enthusiasm for learning Chinese swept across the globe.

The Universal Declaration on Cultural Diversity by UNESCO (2001) stated, 'Cultural diversity served as a wellspring of interchange, innovation, and imagination, just as vital to humanity as biodiversity was to the preservation of ecological equilibrium.' Cultural diversity stood as the shared legacy of humankind, forming the bedrock of human societal advancement and acting as a wellspring of cultural ingenuity and progress. As Zhang Xiaogang (2005) articulated, 'The acceleration of economic globalization underscored the necessity for increased attention to and advocacy for cultural diversity.' Language served as the established conduit of communication.

Among the numerous languages spoken worldwide, Chinese had the largest population of native speakers. Propelled by geopolitical and economic motivations, Southeast Asian nations, with their distinctive ties to China, had progressively adjusted their policies concerning overseas Chinese communities. They implemented a series of measures aimed at fostering and popularizing Chinese education. Over recent years, the advancement of Chinese language acquisition in Thailand has been gradual yet pronounced. This progress has led to heightened demands for effective Chinese language instruction, with teaching methodologies taking center stage in pedagogical research (Xu Chengjing, 2013).

Thailand has established Chinese enrichment courses for elementary school students. The objective was to enhance cultural and educational exchanges between the two nations and pave the way for learners' future development. Fostering students' interest in the Chinese language and establishing a solid foundation have been considered imperative teaching goals (Yin Yuying, 2022). The prevailing situation concerning Chinese instruction had been that, in the majority of schools, Chinese remained an elective subject. To captivate students' attention and nurture their enthusiasm for Chinese, the incorporation of engaging classroom activities and games emerged as an essential instructional component (Yang Jinhua, 2019).

According to the Investigation and Research on the Chinese Learning Status of Primary School Students, there was no apparent disparity in the learning aptitude of elementary school students when it came to acquiring Chinese language skills (Zheng Xiaoyou, 2017). As famously articulated by Einstein: 'The art of teaching was the art of awakening the natural curiosity of young minds to satisfy it afterward' (Einstein, Albert, 1934). Scholars argued that by thoroughly stimulating students' interest throughout the learning process, a positive developmental trajectory could be established, ultimately leading to favorable learning outcomes.

Game-based learning involves integrating games into Chinese instruction. The German philosopher Lazarus (19th century) once proposed that games and entertainment could help people alleviate physical and psychological fatigue caused by strenuous work. He believed that engaging in games and entertainment activities offered a way to eliminate weariness and provide relief. Patrick Zarus (20th century) expanded upon and developed Lazarus's theory, asserting that the concept of play originated from the human need for relaxation. Games and other activities offered an avenue for people to temporarily escape the exhaustion of demanding work. This notion suggested that game activities stemmed from 'racial preferences and racial memories.' Game-based learning sought to empower educators to facilitate instruction through engaging games, enabling students to depart from traditional, monotonous teaching methods. This approach aimed to foster a more relaxed and unconstrained learning environment, stimulating students' enthusiasm for active engagement and exploration. (Wen Jiao, 2022)

Li Qingsong and Xiao Yan (as cited in Wang Lianhui, 2011) pointed out in their work Game Teaching and Its Experiment that the efficacy of game teaching extended beyond facilitating students' easy, enjoyable, and effective grasp of knowledge. It had also been evident in the enhancement of students' self-control abilities, organizational skills, and positive emotional qualities. Both game-based learning and game-based methods served as effective strategies for cultivating such skills (Liu Ziyu, 2020).

The implementation of game-based learning enlivened the classroom atmosphere, heightened students' enthusiasm for learning, improved their attentiveness during class, reinforced memory retention, and elevated the overall teaching quality (Zhang Huijia, 2023). This approach diversified teachers' classroom instruction techniques, stimulated learners' curiosity for learning, and enhanced their learning outcomes, yielding a positive impact (Yin Yuying, 2022).

Recognizing the significance of language learning management, the researcher developed and studied the effectiveness of educational games for the Chinese language. The researcher also compared students' learning achievement in Chinese after using the traditional approach with their achievement after using the game-based learning approach. The researcher envisioned that students would improve Chinese learning achievement in the Chinese language subject while deriving enjoyment and satisfaction from the learning process. Additionally, this perspective guided teachers in enhancing and designing learning management through game-based learning, not only for Chinese language content but also for other subjects, to achieve heightened effectiveness in learning achievement.

Research Objectives

1. To compare Chinese learning achievement before and after learning management through a traditional approach for Primary 5 (Grade 5) students.
2. To compare Chinese learning achievement before and after learning management through game-based learning for Primary 5 (Grade 5) students.
3. To compare Chinese learning achievement by learning management through a traditional approach and game-based learning for Primary 5 (Grade 5) students.

Literature Review

Game-based learning refers to the use of games for educational purposes. It involved defining achievement through games as a learning method without imposing stress or pressure on students, ultimately enhancing their educational levels. This approach facilitated the incorporation of ideas and activities in a stress-free environment, introducing exercises and assessments in engaging ways that encouraged collaborative student participation and fostered

effective learning methods (Kanimozhi and Jayakumar, 2015). Game-based learning and game-based strategies represented trends that were implemented in various settings, including workplace training, education, and social media. Many individuals have encountered game-based engagement techniques in one form or another, whether consciously aware of it or not (Pho Ana and Dinscore Anna, 2015).

Game-based learning involves using language game activities to reinforce and enhance students' acquired knowledge. It served as a means to review and extract practiced language skills and apply them effectively in real-life communication scenarios. This approach not only enlivened the classroom atmosphere but also ensured the attainment of instructional objectives, thereby enhancing overall teaching efficacy. (Zhu Liang, 2008)

The language knowledge acquired through games tended to be more robust because it encompassed elements such as guessing, generalization, imagination, analysis, and imitation. These factors stimulated and reinforced the connections among various variables in students' minds, enhancing memory's ability to trigger knowledge recall and, consequently, promoting structural assimilation (Wang Chuming, 2008).

Game-based learning was used to carry out teaching activities, and teaching goals were achieved through games (Zhang Huijia, 2023). Wu Yexian defined game-based teaching as "a teaching activity that closely combines educational and game elements, allowing students to learn more naturally in a relaxed environment with strong interest." It enabled children to learn in a relaxed and cheerful manner. During the game activities and within that atmosphere, students naturally absorbed the knowledge from the textbook and acquired additional extracurricular knowledge that they were expected to know (Wu Yexian, 1996).

From the study of theoretical concepts in documents and related research, the research conceptual framework was determined as follows:

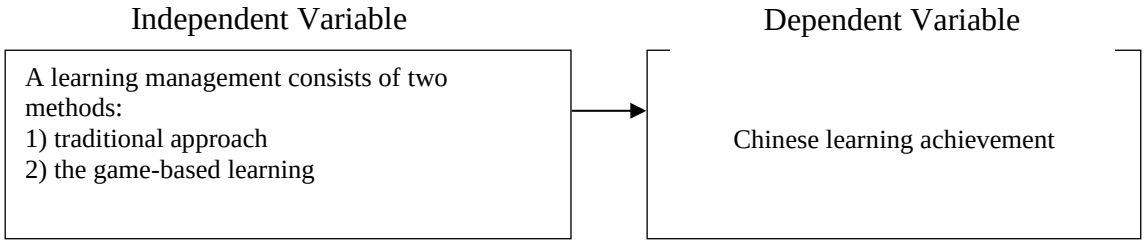

Figure 1 Conceptual Research Framework

Methodology

The study was designed as a quasi-experimental study, specifically utilizing the pretest-posttest control group design. The details of the research methodology were as follows:

1. Population and Sample

This study's population comprised 221 Primary 5 (Grade 5) students and was distributed among 5 classrooms in Thailand, in the 2024 academic year. The sample for this study consisted of 60 Primary 5 (Grade 5) students from two classrooms, selected through cluster random sampling. One class (30 students) was chosen as the experimental group, where students received instruction through game-based learning management, while the other class (30 students) was chosen as the control group, where students received instruction through the traditional approach.

2. Variables

The independent variables in this research comprised two methods: 1) the traditional approach and 2) game-based learning in the Chinese language course. The dependent variable in this research was the achievement of the Chinese language course.

3. Research instrument

The research instruments used in the experiments and data collection were divided into categories as follows:

3.1 The learning management plan using a traditional approach in the Chinese Language Course, Learning Areas: Foreign Languages for the Primary 5 (Grade 5) students was Unit 1, Language for Communication, followed by 2 Title 1) Hometown, and 2) I'm from Beijing. The plan consisted of 3 steps: 1) the introduction, 2) teaching, and 3) the conclusion stage. The IOC (Index of Item Objective Congruence) learning management plan using a traditional approach was equal to 1.00.

3.2 The learning management plan using game-based learning in the Chinese Language Course, Learning Areas: Foreign Languages for the Primary 5 (Grade 5) students was Unit 1, Language for Communication, followed by 2 Title 1) Hometown, and 2) I'm from Beijing. The steps of game-based learning could be roughly summarized in the following way:

Steps 1 Teaching Preparation: Preparation before teaching involved defining the scope of instruction, clearly articulating learning objectives aligned with the content, and gaining an understanding of the students' characteristics in advance.

Steps 2 Teaching: Various content areas were selected to support a diverse range of game preparations, and the necessary game tools were prepared in advance.

Steps 3 Game Demo: The individual differences among students were carefully considered, and the principle of tailoring instruction to each student's aptitude was adopted. Games were then appropriately adjusted and innovated to maximize their effectiveness.

Steps 4 Game Development: The rules of classroom games were clearly explained and demonstrated to ensure that students fully understood and could actively engage with them. Throughout the process, students' adaptability and reactions were carefully observed.

Steps 5 Summary and Evaluation: The teaching outcomes were assessed and summarized, with ongoing improvements made to the process.

The IOC (Index of Item Objective Congruence) learning management plan using game-based learning was equal to 1.00.

3.3 The learning achievement test for the Chinese language course for Primary 5 (Grade 5) students contained 30 multiple-choice questions, each with 4 options for the pre-test and post-tests in the experimental group and control group. The analysis results showed that the IOC value was equal to 0.60-1.00. Thirty quality items were selected for the test. The analysis showed the test had a difficulty of 0.40–0.80 and a discriminating power of 0.50–0.80. The results were analyzed to determine reliability by Cronbach's alpha coefficient (α). The analysis results showed that the total confidence value was 0.925.

4. Data Analysis

The data analysis for hypothesis testing employed both dependent and independent sample t-tests. The dependent sample t-test was utilized to compare Chinese learning achievement before and after the implementation of traditional learning management among Primary 5 (Grade 5) students. Similarly, the dependent samples t-test was used to assess the Chinese learning achievement before and after the application of game-based learning management within the same group of students. Furthermore, an independent sample t-test was conducted to compare the Chinese learning achievement between students exposed to traditional learning management and those who experienced game-based learning in Primary 5 (Grade 5).

Findings

1. The analysis compared Chinese learning achievement before and after learning management through a traditional approach for Primary 5 (Grade 5) students.

Table 1 shows the mean, standard deviation, dependent sample t-test, and level of statistical significance in the analysis to compare Chinese learning achievement before and after learning management through a traditional approach for Primary 5 (Grade 5) students.

The learning management through a traditional approach	n	$\bar{x}$	s	t	df	Sig.
Before	30	20.03	4.902	4.372	29	0.161
After	30	21.43	4.599			

*p< .05

Table 1 showed that the students' mean Chinese learning achievement before the traditional approach was 20.03 ($\bar{x}$ = 20.03, S.D. = 4.902), and after learning, it increased to 21.43 ($\bar{x}$ = 21.43, S.D. = 4.599). When comparing the test scores for both tests, it was found that students' Chinese learning achievement after learning management through the traditional approach was significantly higher than before at a statistical significance level of .05.

2. The analysis compared Chinese learning achievement before and after learning management through game-based learning for Primary 5 (Grade 5) students.

Table 2 shows the mean, standard deviation, dependent samples t-test, and the level of statistical significance in the analysis to compare Chinese learning achievement before and after learning management through game-based learning for Primary 5 (Grade 5) students.

The learning management through game-based learning	n	$\bar{x}$	s	t	df	Sig.
Before	30	20.93	3.667	30	20.93	3.667
After	30	23.93	3.062			

*p< .05

Table 2 showed that the student's learning achievement in the Chinese course had a mean of 20.93 ($\bar{x}$ = 20.93, S.D. = 3.667) before the game-based learning and 23.93 ($\bar{x}$ = 23.93, S.D. = 3.062). Comparing with t-scores, it was found that the student's Chinese learning achievement after the game-based learning was significantly higher than before, at a statistical significance level of .05.

3. The analysis compared Chinese learning achievement through learning management through a traditional approach and game-based learning for Primary 5 (Grade 5) students.

Table 3 shows the mean, standard deviation, independent samples t-test, and the level of statistical significance in analysis to compare Chinese learning achievement by learning management through a traditional approach and game-based learning for Primary 5 (Grade 5) students.

Learning Management	n	$\bar{x}$	s	t	df	Sig. (2-tailed)
The learning management through a traditional approach	30	11.73	1.701	-4.254*	58	0.000
The learning management through game-based learning	30	13.83	2.102			

*p< .05

Table 3 showed that the students' Chinese learning achievement had a mean score of 21.43 ($\bar{x}$ = 21.43, S.D. = 4.599) with the traditional approach and 23.93 ($\bar{x}$ = 23.93, S.D. = 3.062) with game-based learning. When comparing the test scores, it was found that the Chinese learning achievement of students using game-based learning was significantly higher than those using the traditional approach, at a statistical significance level of .05.

Discussions

1. Chinese learning achievement by learning management through a traditional approach was higher than before at the statistical significance level of .05 because the traditional approach was the teachers' ability to provide personalized attention and immediate feedback to students. This direct interaction allowed educators to address individual student needs, helping to clarify misunderstandings and guide learning effectively (Hattie and Timperley, 2007). Students were motivated by both the teacher and their classmates. It was a strategy in which a teacher moderated and controlled the flow of information and knowledge. Students were required to continue strengthening their topic knowledge outside of school by completing homework activities. Students' sole resource in this situation was their instructor, who only taught them face-to-face (Meghana Vyas, 2023). Although traditional lecture-style teaching, it could be effective at improving test scores.

According to the study conducted by Guido Schwerdt, et al. (2011), increasing the overall time devoted to lecture-style teaching led to an increase in test scores when explicitly including the two problem-solving categories and the other class activities. In congruence with the findings of Pittayarat Yamprayoon (2020), the research results were that Chinese speaking skills for everyday use of secondary 4 students before and after learning through conventional learning management were different at a significance level of .05. According to a study by Wang and Wu (2020), students who were taught using traditional methods, which included structured classroom settings and direct teacher-student interaction, showed a significant improvement in their Chinese language achievement. The study also reported a statistically significant increase in test scores, with a p-value of less than .05, indicating that traditional learning management had a positive impact on student outcomes.

2. Chinese learning achievement by learning management through game-based learning was higher than before at the statistical significance level of .05 because game-based learning involved using language game activities to reinforce and enhance students' acquired knowledge. It served as a means to review and extract practiced language skills and apply them effectively in real-life communication scenarios. This approach not only enlivened the classroom atmosphere but also ensured the attainment of instructional objectives, thereby enhancing overall teaching efficacy. (Zhu Liang, 2008) According to Perrotta et al. (2013), game-based learning (GBL) is a methodology that incorporates elements of game theory into the educational process. It was compatible with students because games were a necessary element that should have existed in their learning process. In congruence with Wu Yexian's (1996) game-based learning, students learned more naturally in a relaxed mood with strong interest. It allowed children to learn in a relaxed and cheerful way. In the game activities and atmosphere, students

naturally learned the knowledge in the textbook and acquired more extracurricular knowledge than they would have otherwise. Moreover, Fajarina (2017) stated that utilizing games in the classroom encouraged students to be more involved and engaged with each other. In alignment with this, students exhibited increased enthusiasm for playing games, attributing their positive feelings to the engaging and stimulating nature of the learning process.

Following the findings of Xiaolin Yang (2019), students' learning ability in reading Chinese aloud after using games and learning activities was higher than before using them, with a significance level of .05. The students' posttest mean was 27.03, whereas the students' pretest mean was 13.57, respectively. In line with the findings of Pimporn Wattanakamolkul and Manorat Somkanae (2021), the comparison of learning by memorization before and after teaching and learning management by using games through applications showed that scores after learning were significantly high at the level of .01. Consistent with Kamonwan Satsin, et al. (2019), after using games, the students had post-achievement test scores higher than the pretest at a .05 statistically significant level, according to the hypothesis that using games for students would increase students' achievement of Pinyin reading and enhance Chinese learning. Similarly, Waralee Rungbanjit and Woratha Rungbanjit (2021) found that after implementing Chinese word games, the mean posttest score of 35 students was 15.11, which was higher than the mean pretest score of 9.46, accounting for the difference of 5.66 points with a statistical significance level of .05. Research showed that game-based learning had learning management efficacy for increased academic results.

3. Chinese learning achievement of those studying by learning management through game-based learning was higher than those studying through a traditional approach at the statistical significance level of .05, because the traditional approach was a one-way conversation in which an instructor delivered the information before the audience (Gholami, et al., 2016). After the lecture, the instructor gave notes and assigned some tasks as homework (Gregorius, 2017). In traditional lecture teaching methods, no feedback session for the learners was conducted (Almanasef, et al., 2020). Very little conversation happened between the learners and instructors (Sarıhan, et al., 2016). The learners received a passive strategy of learning (Maqbool, et al., 2018), while the game-based learning was conducted through captivating games, allowing students to break away from monotonous teaching modes, acquire knowledge in a more relaxed and unrestricted manner, and stimulate their enthusiasm for active learning and exploration (Wen Jiao, 2022). Consistent with Li Qingsong and Xiao Yan (as cited in Wang Lianhui, 2011), in their work "Game Teaching and Its Experiment," the efficacy of game teaching had gone beyond facilitating students' easy, enjoyable, and effective grasp of knowledge. It has also been evident in the enhancement of students' self-control abilities, organizational skills, and positive emotional qualities. Both game-based learning and game-based learning served as effective strategies for cultivating such skills (Liu Ziyu, 2020).

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Conclusions

Game-based learning integrated the use of games as a tool for teaching children new concepts, transforming schoolwork from a source of stress into an enjoyable and engaging experience. This approach fostered a collaborative environment where children worked together, exchanged ideas, and practiced newly acquired knowledge in a relaxed setting. As a result, it enhanced their understanding and made the learning process more enjoyable. To effectively incorporate game-based learning into traditional classrooms, it was recommended that teachers integrate appropriate game elements into their teaching strategies. For instance, educators could have increased students' interest and participation by designing educational games, organizing group competitions, or implementing interactive classroom activities related to the course content. To ensure the successful implementation of game-based learning, teachers required professional development training. This training should have covered game design principles, techniques for integrating games into the classroom, and methods for aligning games with course objectives. By enhancing their expertise in game-based teaching methods, teachers were better equipped to design and implement gamified instructional activities, ultimately improving both teaching quality and student learning outcomes.

Future research should have delved into the specific effects of different types of educational games, such as simulation games, role-playing games, and puzzle games, on student learning outcomes. By comparing the impact of various game types on teaching, researchers could have determined which types were most effective in enhancing student learning. These studies would have assisted educators in selecting the game types that best aligned with their teaching goals and met the needs of their students, thereby optimizing educational outcomes. Additionally, game-based teaching not only influenced academic performance but also affected students' psychological and emotional development. Future research should evaluate the effects of game-based teaching methods on students' mental health, stress levels, emotional regulation, and self-efficacy. Understanding the potential of game-based learning to promote students' mental well-being and emotional development would have helped educators use these methods to enhance overall student performance.

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The Effect of Teachers' Learning Agility on Organizational Commitment Attitudes

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ABSTRACT
This study aims to reveal the relationship between the learning agility and organizational commitment attitudes of primary and secondary school teachers in TRNC. The fact that it is the first study to correlate learning agility with organizational commitment attitude distinguishes the research from similar studies in the literature.

The primary data used in the analysis was obtained from 325 teachers working in primary and secondary schools in the districts of Nicosia, Güzelyurt, Kyrenia and Lefke in TRNC, through a survey administered via Google form. Two scales were used to collect the data of the study. "Organizational Commitment Scale" consists of 5 dimensions and 39 items in accordance with the purpose of the research. The “Learning agility” scale consists of 23 items and 4 dimensions.

The relationship and effect between variables were tested with correlation and multiple regression analyses. The results obtained from the analysis revealed that there was a significant effect between the variables. In other words, there is a relation between learning agility and levels on teachers' organizational commitment attitudes in educational organizations.
Keywords: Organizational commitment, learning agility, dedication to school, manager's power resources, dedication to the profession, dedication to the work group.

Introduction

One of the factors that form the basis of teachers' feelings about the work environment is their interest and attitude towards the objects in the work environment (profession, job, work team, student, school). In this sense, teachers show activity according to the importance they attach to these objects and the nature of their relationship with them. Although the degree of effectiveness of educational organizations depends on many elements, one of the most important of these is the interaction of administrators, teachers and students in the teaching and learning process (Celep, 2000).

In general, empirical research has shown that leadership has a direct effect on employees' organizational commitment (Koh et al., 1995; Nguni et al., 2006; Park, 2005). Two of the prominent models in the field of educational leadership are transformational leadership and instructional leadership (Hallinger, 2003). Distributed leadership also has a significant impact on teachers' organizational commitment and school development (Harris et al., 2007; Harris, 2008).

It can be argued that one of the reasons why prospective teachers emphasize their political thoughts rather than professional and scientific values in their attitudes towards the teaching profession is due to the undemocratic attitudes of the faculty members (Celep, 1999).

It has been found that school leadership affects teachers' willingness and attitude towards organizational commitment (Nguni et al., 2006; Park, 2005). Collaboration in the leadership team was found to be positively related to teachers' organizational commitment with a medium effect size. Thus, it shows that teachers prefer school leadership that values group cohesion, role clarity, and goal orientation. Hulpia et al., (2012) concluded that the collaborative leadership team dimension has a positive effect on teachers' organizational commitment.

They also found that principal leadership support had a significant positive impact on their organizational commitment.

Previous research has suggested that both leadership models and an integrated leadership that combines more transformational and educational leadership can have positive effects (Hallinger, 2003). The common point of transformational and instructional leadership (Bass, 1985; Burns, 1978; Hallinger, Murphy, 1985) reveals basic functions of successful leaders.

Learning agility is the willingness and ability to learn from experiences and then apply this learning to perform successfully under new conditions (Lombardo, Eichinger, 2000).

Lombardo and Eichinger (2002) divide learning agility into four classes: human relations agility, mental agility, change agility and results agility. Each dimension has specific skills and a definition that distinguishes it from others (Center for Creative Leadership, 2015; Dries et al., 2012; Gravett, Caldwell, 2016).

Human relations agility involves actively seeking feedback and being open to different people and ideas. Agile people refer to people who know themselves and can easily handle difficult situations. (Center for Creative Leadership, 2015; Dries et al., 2012; Gravett, Caldwell, 2016). It is the degree to which individuals know themselves well, learn from experiences, act constructively towards others, and remain calm and flexible under pressures of change (De Meuse, 2017).

Mental agility is being interested in new ideas and complexity and thinking quickly. Mentally agile individuals are people who are comfortable in complex situations, can examine problems carefully, and make connections between different things (Center for Creative Leadership, 2015; Dries et al., 2012; Gravett, Caldwell, 2016). It is the degree to which individuals think about problems from a new perspective and are comfortable with complexity, uncertainty and explaining their thoughts to others (De Meuse, 2017).

Change agility is the ability to actively participate in the change and optimization process. Individuals with change agility refer to individuals who like to experiment, love learning new things, and can effectively cope with the discomfort of rapid change (Center for Creative Leadership, 2015; Dries et al., 2012; Gravett, Caldwell, 2016). It is the degree to which individuals are curious, passionate about ideas, enjoy experimenting with test scenarios, and participate in skill development activities (De Meuse, 2017).

Results agility is the ability to deliver results, even for the first time or under difficult circumstances. The result refers to agile individuals, resourceful individuals who deliver on teams by inspiring and creating significant impact (Center for Creative Leadership, 2015; Dries et al., 2012; Gravett, Caldwell, 2016). It is the degree to which individuals achieve results under difficult circumstances, encourage others to perform beyond the norm, and demonstrate excellence and build trust in others (De Meuse, 2017).

The personal development areas that individuals with learning agility should have are as follows (Center for Creative Leadership, 2015):

Not afraid to innovate and challenge the status quo;

- Ability to perform, remain calm in the face of difficulty;
- Taking time to reflect on their experiences;
- Taking risks, deliberately putting themselves in difficult situations; And
- Defensiveness, openness to learning, and resisting the temptation to become defensive in negative situations.

By creating an environment where all stakeholders have a sense of responsibility, freedoms that vary from person to person can be given depending on their ability to take responsibility. As individuals mature and grow mentally, the context and boundaries within which students work will begin to expand through reflection. Transactions and aspirations will begin to evolve into actions and collaborative learning experiences, ultimately leading to freedoms, self-reflection, and control, along with high expectations (Schlechty, 1990).

Aim

The main purpose of this research is to reveal the effect of teachers' learning agility types and levels on teachers' organizational commitment attitudes in educational organizations.

Method

In this section, information about the research model, study population, data collection, analysis and interpretation is presented.

Model of the research

This research, which aims to reveal the effect of teachers' learning agility attitudes on their level of organizational commitment, is a causal scanning model that includes causal and comparative examination between variables. Survey model is a research approach that aims to describe the past and present situation as it exists. Correlation type is a research model that aims to determine the existence and/or degree of co-variation between two or more variables (Karasar, 2003, 79-81). Causal comparative screening aims to find possible causes of a behavior pattern by comparing those who have this pattern with those who do not.

Population of the research

The study population of the research consists of teachers working in primary and secondary schools in the districts of Nicosia, Kyrenia, Güzelyurt and Lefke in the Turkish Republic of Northern Cyprus in the 2021-2022 academic year. During the period when the research was conducted, education was interrupted due to the COVID 19 infection. Since the education was carried out through distance education and the research data was collected electronically via Google Form, the study population was also taken as a sample. Just as the permission approval document and announcement text were sent to the schools within the scope of the sample by the Ministry of National Education and Culture, the researcher was also sent an announcement text including the research link via the WhatsApp communication groups of the schools. Within the scope of the sample, 387 teachers completed the survey. Due to some incomplete and incorrect procedures during the preliminary examination, 325 surveys were evaluated.

Data Collection Tools and Scale

To collect data in the study, two different measurement tools were used to determine learning agility and teachers' organizational commitment.

The organizational commitment scale was developed based on two basic structures: in-school and out-of-school dedication focus: "Teachers' Organizational Commitment Scale" developed by Celep (1996) was also used to determine teachers' views on school dedication focus. In accordance with the purpose of the research, the in-school dedication focus scale consists of school and teaching profession dimensions and 29 items. For out-of-school dedication focus, "Teachers' Out-of-School Dedication Focus Scale" (Celep and Bülbül, 2003) was used. The scale consists of 1 dimension and 10 items.

The "Learning Agility Scale" developed by Kaya (2019) was used in the research. The scale consists of 23 items and 4 dimensions." These are: mental, human relations, change and focusing on results agility dimensions.

Results

Order to determine the relationship between teacher learning agility and organizational commitment, non-parametric Spearman Correlation analysis was applied since the data were not normally distributed, and multiple regression analysis was applied to see the relationship. Tables regarding the analysis findings are given below.

Table 1. Spearman Correlation Analysis on the Learning Agility Scale and Teachers' Organizational Commitment Scale Sub-Dimensions

	Variable	1	2	3	4	5	6	7
1.	Commitment to School	1.000						
2.	Commitment to Politics	-.253**	1.000					
3.	Commitment to the Teaching Profession	.405**	-.076	1.000				
4	Mental Agility	.125*	-.139*	.156**	1.000			
5	Human Relations Agility	.064	-.031	.227**	.266**	1.000		
6.	Change Agility	.115*	-0.038	.055	0.019	.366**	1.000	
7.	Results Focused Agility	.057	-0.109	.140*	.251**	.397**	.431**	1.000

N: 325, *p<0.05; **p<.0.01

When the relationship between organizational commitment and learning agility is examined in Table 1 regarding the relationship between variables; It has been determined that there is a statistically significant relationship between change agility and school dedication, mental agility and political and professional dedication, human relations agility and professional dedication, and results focus agility and political and professional dedication.
In order to reveal one of the research problems in this study, "the direct effect of learning agility on organizational commitment", the direct relationships between the variables were examined and reported using OLS (Ordinary Least Squares Method). The variables included in the research and the dimensions of these variables are given below.

A. Learning Agility (Independent variable)
- Mental Agility
- Human Relations Agility
- Change Agility
- Focus on Results Agility

B. Organizational Commitment (Dependent Variable)
- Commitment to School
- Commitment to Politics
- Commitment to the Teaching Profession

2. Examining the Effect of Teacher Learning Agility on Organizational Commitment
The Effect of Learning Agility on Commitment to School It has been determined that the model developed to predict the dimension of commitment to the teaching profession. Organizational commitment level is significant. (F (4,320) =2.779, p≤.05, R^2=.034). Among the learning agility sub-dimensions, mental agility (b1:144) and Change agility (b2:.206) appear to be significant predictors of commitment to school. (respectively, t:2.064, t=-2.599) p≤.05, also the 95% probability confidence interval does not include zero).

When the standardized beta coefficients are examined in **Table 2,** it shows that when other variables are controlled, a one standard deviation increase in the mental agility level tends to increase teachers' school dedication level by .124 points, and a one standard deviation increase in the change agility level increases teachers' school dedication levels by .172 points. The created model predicts approximately 3% of teachers' school dedication levels.

Table 2. Multiple Regression Analysis Results for the Effect of Learning Agility on the Commitment to School

Predictor Variable (Learning Agility)		Effect	β(Beta)	t	p	%95 G.A. Lower	%95 G.A Upper	R	R^2
Constant	3,000	,358	-	8,390	,000	2,294	3,704		
Mental Agility	,144	,070	,124	2,064	,040*	,007	,281		
Human Relations Agility	-,040	,069	-,038	-,575	,566	-,175	,096	,183	
Change Agility	,206	,079	,172	2,599	,010*	,050	,361		,034
Focus on Results Agility	-,047	,084	-,037	-,557	,578	-,213	,119		

Commitment to School

*p> .05

Effect of Learning Agility on Political Commitment: It was determined that the model developed to predict the political commitment dimension from teachers' organizational commitment level was significant (F (4,320) =3.105, p≤.05, R^2=.037). Among the learning agility sub-dimensions, the mental agility (b1: -.218) dimension is seen to be a significant predictor of political commitment (respectively, t: -2.774) p≤.05, also the 95% probability confidence interval does not include zero).

When the standardized beta coefficients are examined in **Table 3**, it shows that a one standard deviation increase in the mental agility level causes a -.166-point decrease in the political commitment level of teachers when other variables are controlled. It is understood that the created model predicts approximately 4% of teachers' political commitment levels.

Table 3. Multiple Regresyon Analysis Results for the Effect of Learning Agility on the Commitment to Politics

Predictor Variable *(Learning Agility)*	**Effect**	**SHB**	**β(Beta)**	**t**	**p**	**%95 G.A. Lower**	**%95 G.A Upper**	**R**	**R^2**
Constant	3,621	,404	-	8,961	,000	2,826	4,416		
Mental Agility	-,218	,079	-,166	-2,774	,006*	-,373	-,063		
Human Relationas Agility	,020	,078	,017	,260	,795	-,133	,174	,193	
Change Agility	-,038	,089	-,028	-,424	,672	-,214	,138		,037
Focus on Results Agility	-,089	,095	-,063	-,935	,351	-,276	,098		
Commitment to Politics									

*p< .05

The Effect of Learning Agility on Dedication to the Teaching Profession: It was determined that the model developed to predict the dimension of dedication to the teaching profession from the organizational commitment level of teachers was significant (F (4,320) =5.333, p≤.05, R^2=.062). Among the learning agility sub-dimensions, the Human Relations Agility (b1: .146) dimension is seen to be a significant predictor of dedication to the teaching profession (respectively, t: 2.985) p≤.05, also the 95% probability confidence interval does not include zero).

When the standardized beta coefficients are examined in **Table 4,** it shows that when other variables are controlled, a one standard deviation increase in the level of human relations agility results in a .193-point increase in the level of teachers' dedication to the teaching profession. The created model predicts approximately 6% of teachers' commitment levels to the profession.

Table 4.Multiple Regression Analysis Results for the Effect of Learning Agility on the Commitment to the Teaching Profession

Predictor Variable *(Learning Agility)*	**Effect**	**SHB**	**β(Beta)**	**t**	**p**	**%95 G.A. Lower**	**%95 G.A Upper**	**R**	**R^2**
Constant	3,423	,254	-	13,473	,000	2,923	3,922		
Mental Agility	,073	,049	,087	1,476	,141	-,024	,170		
Human Relationas Agility	,146	,049	,193	2,985	,003*	,050	,243	,250	
Change Agility	-,071	,056	-,082	-1,262	,208	-,182	,040		,062

Focus on Results Agility	,061	,060	,068	1,020	,308	-,057	,179
Commitment to the Teaching Profession							

*p< .05

Discussion and Conclusion

The teaching profession has a dynamic structure. Developments in the scientific field and changes in social structure require teachers to improve themselves and constantly learn new things.

Teachers' learning to ensure their professional development has an impact on teachers' organizational commitment. Teachers' mental and change agility increases teachers' commitment to learning. Another explanation reveals that teachers who have made learning a natural part of their professional life make great efforts to be a pioneer of change in the region where the school is located.

The increase in teachers' learning agility also increases teachers' school dedication. In particular, teachers' mental agility and agility to change play an impressive role in their commitment to teaching. It is understood that the political commitment of teachers who have mental learning agility is at a low level. In other words, the learning agility, understanding and attitude of teachers exemplify the political commitment of teachers in their professional lives. These teachers tend to give priority to professional and scientific values rather than their political thoughts in their teaching activities.

Human relations agility, which plays a determining role in the quality and direction of teachers' in-school relationships, positively affects teachers' professional dedication.

In other words, when the relationship between teachers is based on human relations agility that enables the development of the teaching profession, rather than personal interest or political understanding, teachers' professional commitment improves positively.

Conflicts of Interest

The authors do not have a conflict of interest with any institution or person.

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The Role of Social Media in Shaping Career Choices of Asian American Students

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Abstract
This study explored the role of social media on the career choices of Asian American students, particularly those opting for non-STEM fields, drawing on qualitative data from a sample of 12 participants. The findings revealed that social media exerted both positive and negative influences on career development. Positive influences included exposure to diverse career possibilities, fostering community connections and support, and providing role models and inspirational content. Conversely, social media could also distort career choices by presenting unrealistic portrayals of different fields. Neutral influences, such as personal decision-making and the sense of belonging facilitated by social media, were also noted. The study underscored the enhancement of self-efficacy and outcome expectations through social media, while also highlighting contextual supports and barriers. Despite the limitations of the small sample size, the research provided valuable insights and suggested directions for future studies to explore the long-term impacts and the potential of social media platforms to support career development. These findings underscored the importance of a balanced and critical approach to the use of social media in shaping career trajectories.
Keywords: Asian American, social media, social cognitive career theory, self-efficacy

Introduction

Asian American students have historically been overrepresented in STEM (Science, Technology, Engineering, and Mathematics) fields, a trend driven by cultural and familial expectations that emphasize the perceived stability and prestige of these careers (Hui & Lent, 2018; Kang et al., 2023; Shen & Liao, 2022). However, those who diverged from this path and pursued non-STEM careers often encountered a unique set of challenges. These challenges can include a lack of support from family and community, limited role models, and societal stereotypes that question their career choices (Cooc & Kim, 2021). In recent years, social media has emerged as a considerable influence on people's lives, providing a platform for Asian American students to explore and validate their interests outside of traditional expectations. This study aimed to give voice to Asian American students in non-STEM fields, allowing them to share their subjective experiences and highlighting the role of social media in shaping their career choices. By examining these influences, the study sought to understand how social media can both challenge and support the career aspirations of Asian American students in non-STEM disciplines.

Theoretical Framework

The theoretical framework guiding this study is social cognitive career theory (SCCT) which emphasizes the critical roles of self-efficacy, outcome expectations, and personal goals in career development (Lent et al., 1994). SCCT provides a comprehensive framework for understanding career decision-making processes. According to Lent et al. (1994), self-efficacy beliefs, which refer to an individual's confidence in their ability to perform specific tasks, significantly influence career interests. These interests subsequently affect career choices and performance. SCCT also acknowledges the importance of personal goals, which guide the direction and intensity of career-related efforts. These goals, shaped by self-efficacy and outcome expectations, play a crucial role in career planning and persistence (Lent et al., 1994, 2000).

Moreover, SCCT considers contextual factors, such as social support and barriers, which can either facilitate or hinder career development. Social support, such as encouragement from family and mentors, can enhance self-efficacy and positive outcome expectations. Conversely, barriers like negative stereotypes or limited access to resources can impede career progress (Lent, 2005; Lent et al., 2010). In summary, SCCT provides a robust model for exploring how self-efficacy, outcome expectations, personal goals, and contextual factors interact to influence career development. This theory is particularly pertinent in examining the career choices of Asian American students, as it highlights the interplay between individual beliefs and external influences in shaping career trajectories.

Related Literature

Social media has fundamentally transformed many aspects of society, particularly in the realm of education and socialization among students. Yang (2018) conducted a study on the acculturation and adaptation of Chinese

students in America, highlighting the significant role that US-based social media platforms play in their everyday lives. The research points to social media as a crucial tool for these students to navigate and assimilate into American culture while maintaining ties with their native heritage. Similarly, Lim Xing Fei and Yuek Li (2022) revealed the significant impact YouTubers have on the attitudes and behaviors of their young audiences, particularly among Asian American students who are avid consumers of YouTube content. Lee and Zhou (2020) addressed the misperceptions about culture and Asian American achievement, highlighting the role of social media in both perpetuating and challenging stereotypes. King and Fretwell (2022) further explored the portrayal of cultural identity by Asian American influencers on Instagram, shedding light on how social media platforms are used to navigate and express cultural identities among Asian American students.

Social media's impact on academic engagement and social interactions has been widely documented. Tuli et al. (2022) examined the broader impact of social media on student life, noting its pervasive influence on academic engagement and social interactions. Their findings suggest that social media can both enhance and detract from students' academic performance, depending on usage patterns and the nature of the content consumed. Perez et al. (2023) conducted a systematic review of social media as a teaching and learning tool in higher education, underscoring its potential to enhance educational outcomes through increased accessibility and interactive learning opportunities. Akbari and Rochaety (2023) explored the impact of YouTube watch time on higher education institution promotions and admissions, illustrating the platform's influence on student recruitment and institutional visibility.

The role of social media in shaping perceptions and social dynamics within educational environments has been explored by several studies. Shahzad (2021) explored the factors that contribute to a YouTuber's popularity among students, illustrating the platform's role in shaping perceptions and social dynamics within educational environments. Kong and Ahn (2020) investigated the information adoption behaviors on YouTube, emphasizing the influence of different genres on user engagement. Their findings illustrate the variability in content consumption and its impact on knowledge acquisition and social interaction. Marbun et al. (2020) examined the effects of social media culture and knowledge transfer on performance, pointing to the enhanced collaborative potential of social media platforms. This study suggests that social media can facilitate knowledge sharing and improve performance in both academic and professional contexts.

The broader societal implications of social media have also been a focus of research. Rawath et al. (2019) provided insights into the impact of social media on youth, emphasizing its dual role as a source of information and a platform for social interaction. They revealed that while social media facilitates connectivity and information exchange, it also presents challenges related to privacy and mental health. Bahadur (2021) investigated the negative effects of social media on youth, providing a critical perspective on issues such as cyberbullying, addiction, and mental health challenges. This study highlights the need for balanced and mindful social media use among students. Chen and Xiao (2022) examined the effect of social media on the development of students' affective variables, such as motivation and self-efficacy, revealing its potential to positively influence the emotional and psychological aspects of student life.

Finally, studies have also looked at the influence of social media on socialization and community engagement. Akdag et al. (2019) analyzed the impact of social media on university students' socialization, using statistical reasoning to reveal complex patterns of interaction and engagement. Their findings suggest that social media plays a significant role in shaping social networks and peer relationships. Dennen et al. (2020) reviewed the intersection of social media, teenagers, and the school context, highlighting the implications for education and socialization. Their findings indicate that social media can both support and hinder educational experiences, depending on the context and manner of use. Gammoudi et al. (2022) conducted a survey on the influence environment of social media and the identification of influencers, underscoring the importance of understanding the dynamics of influencer impact, particularly in educational settings. Zamroni et al. (2019) found that 61% of students use social media to gather information relevant to their career decisions. Despite the extensive research on social media's impact on various aspects of student life, there is a notable gap in the literature regarding Asian American students' career choices. This study aims to fill this gap.

Methodology

The study employed a qualitative research approach to investigate the research question: “How does social media influence the career choices of Asian American students?” The study used purposeful criterion sampling to recruit Asian American individuals who are either currently pursuing or have recently graduated from non-STEM college majors in the United States. From the 104 respondents to the recruitment post on LinkedIn, 12 participants were randomly selected to participate in the study. The selected participants came from ten Asian countries: Afghanistan, Armenia, Bahrain, Bangladesh, Cambodia, India, Japan, Pakistan, the Philippines, and Singapore. The study

adopted a transcendental phenomenological design to capture different perspectives and minimize biased interpretation. Data collection methods included individual interviews, letter writing, and focus groups, providing a comprehensive understanding of the participants' experiences. The analysis focused on understanding the role of social media in their career decision-making processes.

Findings

The transcendental phenomenological analysis of the collected data revealed several themes that provide a comprehensive understanding of how social media influences career choices among Asian Americans in non-STEM fields. These influences can be categorized into three groups: positive, neutral, and negative. Positive influences include (1) exposure to career possibilities, (2) community connection and support, and (3) role models and inspiration. Neutral Influences which are not related to career choices include (1) personal decision-making, and (2) social media as a platform for belonging.

Exposure to Career Possibilities. Social media platforms expose users to different career possibilities. Some students reported that social media shaped their worldview and exposed them to various career possibilities. Seeing professionals share their experiences in fields like publishing, journalism, or academia helped students envision potential career trajectories within the humanities. This exposure can significantly influence career interests and choices by providing information and inspiration that might not be available through traditional channels.

Community Connection and Support. Social media helped the study participants stay connected with their communities and provided a platform for discussion and mutual encouragement. Students often found that social media helped them stay in touch with their community and with people far away. It allowed them to discuss challenges, talk about their worries, share experiences, and encourage each other to move forward. This sense of community provided the participants the emotional support and practical advice, which are crucial for career development.

Role Models and Inspiration. Seeing representation of Asians in various roles on social media motivated the study participants. Students often found that seeing other Asians portrayed in various roles via social media or in political roles gave them motivation. Representation could enhance self-efficacy and outcome expectations by providing relatable role models and success stories. These stories served as a source of inspiration and motivation for students. Images and posts that inspire creativity and imagination on social media lead to increased self-efficacy and motivation to pursue certain career paths.

Personal Decision Making. Some students believed that their career choices were personal decisions that were not significantly influenced by social media. They emphasized the importance of individual agency and the influence of other factors such as personal interests, values, and experiences. While social media might provide occasional insights and exposure to different perspectives, its impact on their decision-making process was limited compared to other factors.

Social Media as a Platform for Belonging. Participants mentioned social media as a tool that provides a sense of freedom and belonging, allowing individuals to connect globally and maintain cultural ties. These individuals felt that having a free hand on social media gives them a different sense of belonging. They emphasized the importance of staying connected with their community through social media.

Negative Influences. Some students perceived social media as a potential negative influence that could distort their career choices. They noted that while social media showed a lot of cool and fun things about different fields, it might sometimes mess up their choice due to the positive portrayals of majors they were not pursuing. This highlights the need for critical engagement with social media content to avoid unrealistic expectations and potential disappointment.

Discussion

The findings of this study align closely with the Social Cognitive Career Theory (SCCT) by Lent et al. (1994), emphasizing the roles of self-efficacy, outcome expectations, and contextual supports and barriers in career development.

Self-Efficacy and Outcome Expectations

This study revealed that social media significantly enhances career-related self-efficacy among Asian American students. By providing success stories and practical advice, social media platforms serve as a repository of motivational content. For instance, students reported feeling more confident and motivated to pursue their desired careers after seeing professionals share their experiences and achievements. This observation aligns with SCCT's

assertion that self-efficacy beliefs influence career interests and subsequent career choices. In terms of outcome expectations, social media shapes students' beliefs about the potential rewards of various career paths. The visibility of role models in diverse fields helps students anticipate favorable outcomes, such as personal satisfaction and financial stability. This supports SCCT's premise that positive outcome expectations can motivate individuals to pursue certain career trajectories.

Contextual Supports and Barriers

The study also highlighted the dual role of social media as both a support and a barrier in career development. Social media provides numerous networking opportunities and access to mentorship, which are crucial for career guidance and support. These platforms enable students to connect with professionals, seek advice, and gain insights into different career paths. This aligns with SCCT's emphasis on the importance of social support in enhancing self-efficacy and positive outcome expectations. However, social media also presents significant barriers, such as exposure to negative stereotypes and unrealistic portrayals of certain careers. Students reported feeling disillusioned by the glamorized depictions of professional life, which sometimes led to unrealistic expectations and subsequent disappointments. This finding is consistent with SCCT's recognition of contextual barriers that can impede career progress.

Conclusion

This study addresses the significant influence of social media on the career choices of Asian American students. Social media shapes their self-efficacy, outcome expectations, and personal goals, presenting both opportunities and challenges. This underscores the need for a balanced and critical approach to its use in career development. However, the study has a limitation on the small sample size of 12 participants which did not capture the full diversity and complexity of the Asian American student population.

Future research should include a larger and more diverse sample to explore the long-term impacts of social media on career trajectories. Additionally, it is essential to investigate the potential differences across various social media platforms and develop interventions that leverage social media to support career development. These interventions should be tailored to address the unique needs of Asian American students. By addressing these gaps, future studies can provide a more comprehensive understanding of the multifaceted influences of social media on career development. This will help develop strategies to harness the positive potential of social media while mitigating its risks. The study findings not only align with but also expand upon the Social Cognitive Career Theory (SCCT) by highlighting the significant role of social media in influencing self-efficacy, outcome expectations, and contextual supports and barriers among Asian American students.

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The Significance of Educational Technology in Higher Education: An Hermeneutic Phenomenology Examination for Expanding the Theoretical Bases of Connectivism Theory

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ABSTRACT
Educational technology integration within higher education has significantly changed the teaching and learning environments. However, the theoretical foundations guiding these changes, particularly connectivism theory, suggest that learning occurs through networks facilitated by digital technology and has not been fully developed. Despite its relevance in the digital age, connectivism has faced criticism and skepticism due to a lack of empirical support. This hermeneutic phenomenological study seeks to explore the experiences of educators in higher education to provide empirical evidence for expanding the theoretical foundations of connectivism. Through in-depth interviews, focus groups, and the analysis of letter-writing activities, this research investigates how educators perceive and anticipate the evolution of teaching methods in response to technological advancements and the increasing focus on connectivism in higher education. The study employs a hermeneutic phenomenological approach to interpret these experiences, linking them to the fundamental principles of connectivism learning as a networked process, distributed knowledge, and the role of digital technology in knowledge creation. The findings suggest that educational technology facilitates meaningful connections between learners, which fosters a networked learning environment that aligns with connectivism theory. The study also reveals gaps in the theory, particularly in addressing emerging technologies such as artificial intelligence (AI) and personalized learning platforms. Building on these lived experiences, this research proposes an expanded version of connectivism as a significant contribution supported by empirical evidence from higher education contexts. The study provides implications for educators, administrators, and policymakers in leveraging educational technology effectively and offers theoretical advancements for understanding learning in the digital age.

INTRODUCTION
As educational technology revolutionizes higher education, the frameworks we use to understand learning must evolve accordingly. A significant framework to consider is the connectivism theory, which suggests that learning in the digital age occurs through technology-facilitated networks (Siemens, 2004, 2005). However, due to a lack of empirical research, connectivism is often dismissed and discouraged despite its potential relevance. The lack of empirical research regarding connectivism undermines its ability to serve as a legitimate foundation for understanding modern learning environments. In a world where technology is rapidly transforming education, this research is crucial to expanding the theoretical understanding of how students and educators truly experience learning through digital technology. This study employs a hermeneutic phenomenological approach to explore the lived experiences of educators in higher education using educational technology. It also examines how educators perceive and anticipate the evolution of teaching methods in response to technological advancements and the increasing focus on connectivism in higher education. It addresses the current gap by providing empirical evidence that expands the theoretical foundations of connectivism theory. Through individual interviews, focus groups, and the analysis of letter-writing activities, the research investigates how these experiences reflect and challenge connectivism theory. The findings propose ways to enhance the theory by integrating contemporary technological practices, offering implications for educational policy, teaching practice in the classroom, and future research regarding connectivism theory.

BACKGROUND OF THE STUDY
This study is authenticated by historical, social, and theoretical frameworks of connectivism theory, which inform its investigation. Historically, events such as the COVID-19 pandemic have significantly influenced the current state of higher education, particularly regarding the widespread adoption of online learning. The transition to online learning resulted in nearly all higher education institutions switching to virtual course formats (Li, 2022; Wei & Chou, 2020). The social context of this research encompasses the complex network of connections and interactions that facilitate learning among various stakeholders, including students, faculty, and support personnel in the digital era. Theoretical guidance for the study is drawn from connectivism theory (Siemens, 2004, 2005), which emphasizes the role of networks and technology in knowledge acquisition.

Historically, education has relied predominantly on face-to-face interactions between educators and students to establish meaningful connections and engagement. However, the educational landscape has experienced a paradigm shift by introducing learning management systems (LMS) and other technological innovations during the late 20th century (Karakose & Demirkol, 2021; Li, 2022; Palvia et al., 2018). Early online learning was often characterized by static content, minimal interaction, and low engagement (Palvia et al., 2018; Piccoli et al., 2001). With technological advances, the capacity to create interactive and vibrant learning environments has emerged by enabling more immersive educational experiences. Computers, the internet, and digital platforms have revolutionized how education is presented (Downes, 2019). By the turn of the 21st century, digital technologies were essential in reshaping educational practices, which makes them more flexible and learner-centered (Barabasi, 2003; Siemens, 2006). Over time, educational technology integration in teaching practices has become prevalent in transitioning from fundamental tools such as chalkboards and overhead projectors to sophisticated digital platforms such as Canvas and Blackboard (Dawo & Sika, 2021). The widespread use of the internet and digital technologies has fostered learning modifications, emphasizing networked learning over traditional models (Siemens, 2004). Connectivism theory, introduced by George Siemens, theorizes that learning increasingly relies on external networks, such as digital resources and human interactions, and the effective navigation of these networks is critical to knowledge acquisition. This theoretical framework highlights the transformative potential of educational technology in fostering engagement and collaboration (Downes, 2019).

The surge in online learning, particularly accelerated by the COVID-19 pandemic, has presented new challenges and opportunities for educational institutions (Drigas et al., 2023; Zhu et al., 2023). As educators quickly adapted to remote learning, the significance of technology in maintaining student engagement and fostering meaningful connections became increasingly evident. However, virtual communication tools often lack the subtle and interpersonal effects of in-person interactions, which challenge effective teaching and learning (Bond & Bedenlier, 2019; Vezne et al., 2023). These challenges have raised concerns about how to best employ educational technology to promote academic success and retention, especially in higher education settings (Babincakova & Bernard, 2020; Kardambikis & Donne, 2022). As online education continues to expand, educators have shifted their focus from the novelty of technology to optimizing student engagement and retention (Drigas et al., 2023). The increasing reliance on social media and digital communication platforms has both connected individuals widely and introduced challenges in establishing authentic, networked learning environments (Matee et al., 2023). With many emphasizing the need for authentic strategies to foster meaningful connections and community among students, researchers have been investigating student engagement within virtual settings, with many emphasizing the need for authentic strategies to foster meaningful connections and community among students (Aluko et al., 2022; Eden et al., 2022).

Educators encountered challenges in engaging students and fostering connections in remote settings, revealing disparities in students' experiences with online learning (Alisemiel et al., 2022; Babincakova & Bernard, 2020) during the COVID-19 pandemic. While some students excelled, others grappled with disengagement and decreased motivation, which impacted retention and graduation rates (Babincakova & Bernard, 2020; Chiemela et al., 2022). The transition to higher education funding models reliant on student contributions has heightened the urgency for institutions to address student engagement and retention issues (Babincakova & Bernard, 2020). Connectivism, introduced by Siemens in 2004, builds upon traditional learning theories by recognizing the significant role of digital technologies in the learning process. Siemens argues that learning in the digital age is interconnected and relies on a network of nodes, including people, digital tools, and information systems. Educational technology supports access to and navigation of these networks while promoting knowledge acquisition and application. It can enhance academic performance and student engagement by fostering cooperation, collaboration, and self-directed learning (Siemens, 2004, 2005).

Recent studies have applied the connectivism theory to explore various aspects of learning environments, such as relationships, engagement, and interaction (Haris et al., 2023; Jung, 2019; Plueger, 2024). These studies have highlighted the complexities of using technology to engage students in meaningful learning experiences, particularly in online settings where personal interaction may be limited (Bond & Bedenlier, 2019; Kostenius & Alerby, 2020; Vlachopoulos & Makri, 2019). The importance of fostering authentic network connections in virtual classrooms has become increasingly critical as institutions continue to invest in technology-driven learning environments (Annansingh, 2019; Eden et al., 2022; Ferrer et al., 2022). Studies exploring student engagement and educational technology have identified practical strategies for enhancing learning outcomes, such as leveraging interactive tools, promoting communication, and fostering collaboration (Bolliger & Halupa, 2018; Fox, 2019; Li, 2022; Turan et al., 2022). The research highlights the importance of educator presence, responsiveness, and the use of synchronous and asynchronous communication channels in maintaining student engagement. This study builds upon these insights by using connectivism principles to investigate how educators in higher education leverage technology to build connections that enhance student engagement and achievement. By aligning

connectivism theory with phenomenological methods, this study provides an understanding of how educators perceive and anticipate the evolution of teaching methods in response to technological advancements and the increasing focus on connectivism in higher education. This research offers valuable insights into improving pedagogical practices and educational frameworks for fostering student engagement and academic success in a rapidly evolving technological landscape.

RESEARCH PROBLEM

The problem is that connectivism theory is not widely acknowledged and is frequently discouraged within the sphere of educational research and practice due to the insufficiency of empirical studies substantiating its efficacy. Connectivism presents a promising theoretical framework for understanding learning in the digital age. However, its limited use and rejection are attributed to insufficient empirical evidence. This study seeks to address a gap by providing empirical insights into the perceptions and anticipations of educators in higher education regarding the evolution of teaching approaches in response to technological advancements and the increasing emphasis on connectivism using educational technology. This research study will contribute to enriching the theoretical foundations of connectivism.

PURPOSE OF THE STUDY

The purpose of this hermeneutic phenomenological research study is to comprehensively explore and interpret the lived experiences of educators. The study provides an understanding of how educators perceive and anticipate the evolution of teaching methods in response to technological advancements and the increasing focus on connectivism in higher education. By examining the educator's personal narratives, this study discovers how the educator's experiences shape their instructional practices while providing prosperous empirical evidence that supports and extends the theoretical framework of connectivism. Specifically, this research seeks to understand how educators' perceptions and anticipations align with or challenge the core principles of connectivism theory. In doing so, the study contributes to the empirical validation of connectivism theory, which offers insights expanding on the comprehensive understanding of learning in the digital age by significantly broadening the theoretical scope to account for contemporary technological advancements and educational contexts.

RESEARCH QUESTION

How do educators perceive and anticipate the evolution of teaching methods in response to technological advancements and the increasing focus on connectivism in higher education?

LITERATURE REVIEW

The literature review examines educational technology's historical development and integration into higher education. The review outlines the significant transformation that has taken place as higher education institutions have increasingly embraced digital technology and platforms to enhance learning environments. This section traces the evolution of technological advancements, from early implementations to modern systems such as learning management platforms and interactive online resources, and discusses how these tools have reshaped instructional practices and student engagement. The review then transitions to the connectivism theory introduced by George Siemens and Stephen Downes (Siemens, 2004; Downes, 2019). Connectivism theory positions knowledge acquisition as a networked process where information is distributed across various nodes, including digital platforms, databases, and individuals (Siemens, 2004, 2005). The core principles of connectivism emphasize the importance of these networks and the role of technology in facilitating learning by enabling individuals to connect with and navigate diverse sources of knowledge (Siemens, 2004). Despite its relevance in the digital age, connectivism has faced criticism due to the lack of empirical substantiation (Jung, I., 2019). The literature highlights significant theoretical gaps and critiques, particularly concerning the limited empirical research base. As a result, connectivism is often disregarded or discouraged as a framework in educational practice, which emphasizes the need for empirical validation to further develop and legitimize it as a model for higher education learning (Plueger, C., 2024). The review concludes by examining the application of hermeneutic phenomenology in educational research by contending that the methodological approach is particularly suitable for interpreting the authentic experiences of educators in digital technology-driven learning environments. Hermeneutic phenomenology is a valuable means for bridging the gap between theoretical frameworks like connectivism theory and practical educational experiences, offering in-depth qualitative insights to validate and enrich theoretical models.

Educational Technology in Higher Education

Educators in Higher education are increasingly expected to incorporate digital technologies to improve teaching and learning practices (Masenya, 2021). Research shows that many educators lack the necessary skills, knowledge, and confidence to effectively integrate technology into their pedagogy (Lowenahal & Lomellini, 2022; Masenya, 2021). The absence of strong instructional design capabilities poses a significant barrier to the successful

integration of technology (Koh, 2019). Educators also face challenges in selecting the appropriate technological tools that align with the subject matter, learning environment, student characteristics, and cultural contexts (Njiku et al., 2019). Scholars such as Kopcha et al. (2020) emphasize that educators are aware of the importance of aligning technology use with established standards and learning objectives. However, technology adoption continues to present a substantial challenge for many educators, as Kopcha et al. (2020) highlighted.

As educators engage with digital transformation, they are compelled to shift from traditional instructional methods. The integration of e-learning tools such as social media, online games, multimedia, and mobile devices has significantly reshaped the educational landscape (Masenya, 2021; Olusanya, O., 2023). Effective integration of these technologies, however, requires educators to possess digital literacy and a high level of competence in using Information and Communication Technologies (ICTs) to retrieve, evaluate, create, and communicate information (Paul, 2021). By developing technological competencies, educators contribute to informal learning communities and address skill gaps, yet equipping educators with these competencies remains a persistent challenge (Olusanya, O., 2023). This highlights the need for concerted efforts from the global educational and telecommunications sectors to address the digital divide (Masenya, 2021; Paul, 2021).

Experts argue that integrating technology and fostering connections among learners can significantly enhance student engagement in higher education (Asif et al., 2021; Donham et al., 2022; Masenya, 2021). To achieve this, educators are encouraged to incorporate technology into their teaching strategies and create virtual environments that promote collaboration, communication, and active participation (Donham et al., 2022). Furthermore, Eshelman and Hogue (2023) provide evidence that a comprehensive approach combining TPACK (Technological, Pedagogical, and Content Knowledge), the Triple E Framework (Engagement, Enhancement, and Extension), and the CAFE model (Content, Activities, Facilitation, and Evaluation) effectively enhances the lesson-planning process in educational contexts. Educators can create more personalized, dynamic, and inclusive learning environments by implementing pedagogical approaches that foster interpersonal relationships and employ technology to increase student engagement (Asif et al., 2021). Enhanced communication, collaboration, and reflective practices can enable educators to forge stronger connections with students, resulting in higher engagement levels and improved learning outcomes (Asif et al., 2021; Donham et al., 2022). Consequently, technology is recognized for its potential to elevate student engagement and improve educational quality.

Higher education institutions are increasingly adapting to a digital environment that diverges from traditional educational paradigms (Masenya, 2021; Paul, 2021). Educators now require a deep understanding of digital tools, platforms, and innovative teaching methods to effectively meet the needs of contemporary learners. A study by Kim et al. (2020) highlights the critical importance of digital literacy, e-learning platform knowledge, and familiarity with the technological preferences of today's students. Educators must engage in hands-on technological experiences tailored to educational contexts as society endures significant technological transformations. Expertise in areas such as Learning Management Systems (LMS), virtual pedagogical environments, multimedia content curation, and the use of social media as an educational tool can support educators in integrating digital tools within the educational field (Kim et al., 2020; Masenya, 2021).

The integration of technology in education extends beyond instructional methods to include assessment practices, feedback mechanisms, and broader channels of educational communication. Higher education institutions are driven by the need to remain competitive and relevant globally, prompting the adoption of digital tools. Lee and Kwon (2023) identify an emerging demand to meet the educational expectations of digital natives—students who have grown up in a digital environment and possess distinct learning preferences. While adopting digital technologies in higher education presents challenges and opportunities (Johnson & Welsch, 2020), proficient use of these tools can enhance student engagement, facilitate personalized learning pathways, and broaden the pedagogical scope beyond traditional classroom settings. Continuous professional development, flexibility, and awareness of evolving educational principles are essential for educators to drive the ongoing transformation brought about by the digital revolution (Koh, 2019; Koh & Kan, 2021).

Technology plays a crucial role in instruction, assessment, feedback, and communication (Lee & Kwon, 2023). A variety of factors contribute to the integration of digital technologies (Paul, 2021), including institutional pressure to maintain global relevance (Lee & Kwon, 2023) and the need to accommodate digital-native students (Masenya, 2021), who have distinct expectations shaped by their digital upbringing (Paul, 2021). While implementing digital technologies poses challenges, it also offers opportunities for enhanced student engagement, personalized learning, and expanded educational horizons. However, successful integration of these tools requires ongoing professional development, adaptability, and recognition of the dynamic nature of education (Masenya, 2021; Paul, 2021).

In recent years, the use of technology in education has become more widespread which offers unique avenues for building interpersonal relationships between students and educators (Kostenius & Alerby, 2020; Leslie, 2020). Studies by Kostenius and Alerby (2020) and Leslie (2020) highlight the potential for technology to enhance interpersonal interactions in educational contexts. Kostenius and Alerby (2020) emphasize the importance of fostering the well-being of both students and educators in online and blended learning environments facilitated by tools such as online forums, video conferencing, and social media. Implementing these technologies has the potential to strengthen relationships and promote collaboration between students and educators, ultimately contributing to a more caring, supportive, and engaging learning environment. Leslie's (2020) research focuses on the role of technology in improving student engagement through faculty development programs by demonstrating that the use of technology in educational settings can enhance interpersonal relationships. By utilizing various technological platforms, educators can create more supportive and engaging learning environments that foster empathy and connection between students and instructors. Nevertheless, it is important to note that technology alone cannot fully cultivate meaningful relationships; educators must also foster a culture of inclusivity and support (Kostenius & Alerby, 2020; Leslie, 2020).

As technology advances, its impact on education and interpersonal relationships grows. Educators have access to professional development opportunities that allow them to use technology to enhance academic achievement, motivation, engagement, and communication (Donham et al., 2022). College students, particularly those aged 18–23, are described as highly dependent on technology, having never known a world without it (Asif et al., 2021; Donham et al., 2022). In the present day, living in an increasingly connected and interdependent society is a necessity (Hye et al., 2020; Springett et al., 2022). However, students may experience increased anxiety and stress when separated from their technological devices (Huda, 2019; Parker & Hodgson, 2020). Research indicates that educators who incorporate technology to design interactive and engaging activities requiring student collaboration across different curricula enhance student involvement, collaboration, and communication (Avsec, 2023; Kraiger et al., 2022). For example, educators may use instructional games or simulation software to teach specific topics (Avsec, 2023) or invite students to collaborate on projects using interactive communication platforms. By leveraging the full capabilities of various technological tools, educators foster a sense of belonging among students and successfully balance the benefits of technology with in-person interactions (Huda, 2019; Hye et al., 2020).

Connectivism Theory

Connectivism, introduced by George Siemens (2004) and expanded by Stephen Downes (2019), provides a framework for understanding how learning occurs in a digital age, which emphasizes the role of networks in knowledge acquisition. In contrast to traditional learning theories, connectivism theorizes that knowledge is distributed across a network of human and non-human information sources, such as digital technologies and databases (Siemens, 2004, 2005). According to connectivism, learning is a process of connecting these various nodes of information (Siemens, 2004). As learners engage with these networks, they develop the capacity to navigate, evaluate, and integrate diverse information. The theory highlights the transformative role of digital technology in facilitating learning, as it enables individuals to access, share, and create knowledge more effectively than in traditional learning environments. The theory emphasizes the significance of preserving and fostering these connections, as they serve as the basis for continuous learning in a rapidly evolving information environment (Siemens, 2004, 2005; Downes, 2019)

George Siemens first introduced the Connectivism theory in 2004 to provide an essential framework for addressing challenges such as declining academic performance and increasing student attrition rates in higher education (Siemens, 2004). Connectivism theory is structured around eight core principles of learning: embracing the diversity of opinions, connecting information nodes, facilitating non-human learning, prioritizing capacity over current knowledge, maintaining and nurturing connections, integrating interdisciplinary knowledge, staying current with evolving information, and using decision-making as a learning process (Siemens, 2004). In the digital context, connectivism relies on these eight key principles, which stress the importance of engaging with multiple perspectives, interacts with diverse knowledge sources, and recognizes the value of both human and non-human entities in learning. The approach highlights the necessity of continuously acquiring and integrating knowledge while maintaining active connections that support ongoing learning. The theory also emphasizes the interconnections between different disciplines and concepts. Additionally, it focuses on the importance of staying up to date with the rapid evolution of information and refining decision-making and evaluative skills. Together, these principles highlight the complexity of learning in the digital era and reflect the wide-ranging influence of Connectivism (Siemens, 2004, 2005, 2006). Connectivism principles serve as a foundation for research exploring educators' experiences and perceptions of academic performance and retention. They emphasize that learning extends beyond individual cognition and includes networks and organizations while stressing the critical role of connections, digital resources, and technology as key enablers of the learning process (Siemens, 2004; Siemens,

2005). With understanding Siemens's theoretical framework, connectivism provides valuable insights into how learners acquire, apply, and navigate knowledge in technologically advanced learning environments.

Stephen Downes (2019, 2022) further expanded the connectivism theory to address the digital age's unique challenges and educational demands. The framework offers innovative insights into learning within networked contexts while drawing upon established educational and cognitive principles. Historically, instructional design has relied on three primary learning theories: behaviorism, cognitivism, and constructivism (Siemens, 2004). However, these theories predate the profound impact of technology on education. Over the past two decades, rapid technological advancements have transformed various aspects of life, including communication, education, and everyday activities (Siemens, 2006). Therefore, it is essential to consider the social context in which learning occurs by acknowledging both the principles and processes supporting learning in a digitally interconnected world.

Criticisms and Gaps in Connectivism Theory

Despite its potential as a learning theory for the digital age, connectivism theory has faced considerable criticism, particularly due to the lack of empirical research supporting its claims. Although Siemens and Downes introduced connectivism as a novel theory to address learning challenges in technology-rich environments, critics argue that it has not been sufficiently tested through empirical studies. This lack of empirical validation limits its adoption and recognition as a robust framework in higher education (Dziubaniuk et al., 2023; Jung, I., 2019). Many scholars have pointed out that while the theoretical concepts are compelling, they remain underdeveloped regarding measurable outcomes and evidence-based application (Al-Maawali, 2022; Al-Mutairi & Bin Mubayrik, 2021; Chandrappa, 2018).

A significant critique is that connectivism lacks a clear distinction from pre-existing learning theories such as constructivism and social learning theory, which also emphasize collaborative and networked learning. Scholars argue that connectivism's core concepts, such as learning through networks and distributed knowledge, mirror ideas already present in these established theories, raising questions about its uniqueness as a separate learning paradigm (Dawo & Sika, 2021; Dziubaniuk et al., 2023; Baque et al., 2020). For example, while connectivism stresses learning through human and non-human nodes, constructivist and social learning theories have long highlighted the importance of collaborative learning and social interactions in the knowledge-construction process (Astin, 1999; Jacobsen, 2019; Johnson & Welsch, 2020).

Connectivism has been criticized for its abstract nature and the challenge of putting its principles into practice (Goldie, 2016). Critics argue that while its concepts, such as learning through networks and decision-making as a learning process, are intriguing, the connectivism principles offer limited practical guidance for educators (Jung, I., 2019). The lack of specificity makes it challenging to design empirical studies that can rigorously test its claims (Al-Maawali, 2022; Al-Mutairi & Bin Mubayrik, 2021; Chandrappa, 2018). Additionally, the absence of detailed pedagogical strategies and measurable outcomes hampers its application in educational settings, which leaves educators with little direction on how to implement connectivism principles in practice (Page et al., 2020; Wylie, 2023).

Furthermore, connectivism has been criticized for prioritizing digital technologies as the primary facilitator of learning by potentially overshadowing the human and social elements of education that are fundamental to other educational theories (Dawo & Sika, 2021; Jung, I., 2019). This heavy reliance on technology may limit the understanding of the learning process, particularly in settings with limited digital access and skills. To establish connectivism theory as a recognized framework in higher education, there is a critical need for more empirical research that explores its applicability in practical educational contexts. Studies that examine how learners engage with digital tools, how networks influence knowledge acquisition, and how educators can design effective learning environments based on connectivism principles are essential. Without this empirical evidence, connectivism remains a theoretically intriguing but practically underutilized concept in educational research and practice (Dziubaniuk et al., 2023; Jung, I., 2019).

Hermeneutic Phenomenology in Educational Research

Hermeneutic phenomenology presents a suitable methodology for exploring and interpreting the experiential dynamics of educators and students engaging with educational technology. This approach is centered on comprehending subjective experiences and meanings within specific contexts, thereby enabling researchers to investigate how individuals experience and make sense of educational technology (Husserl, 1965; Moustakas, 1994). Through capturing the lived experiences, hermeneutic phenomenology facilitates the interpretation of how educators perceive and anticipate the evolution of teaching methods in response to technological advancements and the increasing focus on connectivism in higher education, which makes it appropriate for examining the intricate dynamics prevalent in modern learning.

Hermeneutic phenomenology is distinguished by its capacity to bridge the gap between theory and practice (Husserl, 1965; Moustakas, 1994) by making it a valuable methodology in educational research. Unlike traditional educational theories, which often prioritize abstract principles, hermeneutic phenomenology focuses on collecting qualitative data that reflect realistic experiences. By examining how educational technology is experienced in authentic settings, this methodology provides valuable insights into the practical manifestations of theoretical concepts. As a result, educational theories can be refined to better align with contemporary educational practices (Moustakas, 1994).

Additionally, hermeneutic phenomenology provides valuable qualitative insights that can be effectively applied to developing and implementing education (Moustakas, 1994). The detailed, descriptive data obtained through this approach enables researchers to identify practical challenges, opportunities, and the real-life impact of technology on learning and teaching. By interpreting the significance that educators attribute to their use of technology, this methodology reveals trends that can guide instructional design, professional development, and policymaking, ultimately leading to more efficient and meaningful integration of technology in education.

RESEARCH METHODOLOGY

Research Approach: Hermeneutic Phenomenology

Hermeneutic phenomenology offers a profound framework for exploring the experiences of educators and students as they engage with educational technology. Grounded in the philosophical traditions of phenomenology and hermeneutics, particularly the work of Heidegger and Gadamer, this approach seeks to describe experiences and interpret and uncover the deeper meanings individuals attach to their encounters with technology (Suddick, et al., 2020). Unlike transcendental phenomenology, which focuses on identifying the essence of experiences, hermeneutic phenomenology emphasizes the process of interpretation and understands how broader cultural, social, and historical contexts shape experiences (Moustakas, 1994). Interpretive depth is crucial when studying how educational technology is perceived, navigated, and utilized in educational settings.

For educators, integrating educational technology into teaching represents more than a shift in methodology; it often entails reevaluating their roles, responsibilities, and pedagogical values. Hermeneutic phenomenology allows researchers to examine the various ways educators interpret their use of technology. Beyond functional aspects, such as how to operate software or manage digital platforms, educators engage with technology in ways that influence their self-perception as professionals, their sense of competence, and their relationships with students. This approach illuminates how educators make sense of the tensions between traditional teaching practices and the demands of modern, technology-enhanced classrooms. In doing so, it reveals the emotional and intellectual labor involved in adopting new educational technology, whether they experience a sense of empowerment through digital innovation or struggle with the anxiety of insufficient support and training.

Students bring a diverse range of experiences to their interactions with educational technology. Many belong to the category of "digital natives," having grown up in a world where digital technologies are pervasive (Annansingh, F., 2019; Asif et al., 2021). However, their engagement with technology in learning environments is complex and heavily influenced by personal, academic, and social factors (Plueger, C., 2024). Hermeneutic phenomenology enables researchers to discern how educators derive meaning from interactions with technology for student engagement through virtual classrooms, online collaborative tools, or multimedia learning resources. The hermeneutic approach examines beyond mere usage patterns to comprehend how educators perceive and anticipate the evolution of teaching methods in response to technological advancements and the increasing focus on connectivism in higher education. The research study highlights the ways in which technology either enhances or complicates their teaching approaches, facilitating a more human-centered understanding of experiences in the digital age.

Ultimately, hermeneutic phenomenology empowers researchers to bridge the divide between theoretical concepts, such as connectivism theory, and the actual experiences of educators interacting with technology in higher education. By emphasizing interpretation and context, this methodology unveils the profound significance of digital technology, offering valuable insights into how educators can harness technology to cultivate meaningful connections, enrich learning, and navigate the ever-changing landscape of education.

Research Design

A qualitative research methodology was identified as the most appropriate approach for examining the experiences of educators. This approach focuses on how educators perceive and anticipate the evolution of teaching methods in response to technological advancements and the growing emphasis on connectivism in higher education at public institutions in the southern region of the United States. A hermeneutic methodology was particularly suitable for

studying the use of educational technology to enhance student engagement and foster academic success (Asif et al., 2021; Bolliger & Halupa, 2018). Qualitative methods allowed researchers to explore participants' lived experiences and perspectives (Maxwell, 2012). Given the rapidly changing landscape of higher education, where technology integration is essential, qualitative research effectively captured educators' intricate and context-dependent perspectives. The study aimed to provide a contextual understanding of these experiences through the lens of connectivism theory (Siemens, 2004).

The researcher opted for hermeneutic phenomenology due to its relevance in examining participants' subjective experiences and obtaining insights into how educators perceive and anticipate the evolution of teaching methods in response to technological advancements and the increasing focus on connectivism in higher education (Moustakas, 1994; Siemens, 2004). The hermeneutic approach facilitated a profound understanding of human experience patterns and the development of themes that provided a philosophical interpretation of the educators' interactions with technology (Moustakas, 1994). In the context of higher education, educators have a crucial role in establishing a conducive learning environment for student success (Tuiloma et al., 2022). Qualitative research has proven to be an invaluable method for comprehensively understanding pedagogical practices and experiences (Maxwell, 2012). The approach immersed researchers in the educators' preferences, behaviors, and challenges while allowing them to consider contextual factors, motivations, and achievements (Hill et al., 2021). By focusing on the perspectives of the participants, qualitative research enabled the identification of unexpected themes and connections that may not have emerged through quantitative analysis alone.

The adaptable nature of qualitative research makes it well-suited for examining the intricate connections between technology, human interaction, and student engagement (Vlachopoulos & Makri, 2019). The qualitative reach approach offered the depth and rigor needed to investigate how educators perceive and adapt to changes in teaching methods due to technological advancements and the growing emphasis on connectivism in higher education. Additionally, it allowed researchers to explore educators' personal experiences with technology and its impact on student participation and academic performance. Using this methodology, researchers gained insights into the complex mechanisms at work in innovative higher education settings and contributed to enhancing teaching practices across various disciplines.

To gain a comprehensive understanding of how technology is used in higher education and its impact on student achievement, it was crucial to explore the participants' beliefs, emotions, perceptions, and experiences. Hermeneutic phenomenology enabled researchers to interpret these experiences in a way that acknowledged the complexity of human interactions and the broader social context (Moustakas, 1994). This approach was vital for examining the intricate dynamics influencing how educators perceive and anticipate using educational technology. The hermeneutic approach provided a framework for investigating individuals' subjective experiences and perceptions in their natural environments while building on the philosophical tradition of phenomenology, which Edmund Husserl developed and later expanded by scholars such as Moustakas (1994).

Ultimately, the approach encouraged researchers to remain open and inquisitive toward participants' experiences, which discovers unexpected insights and perspectives. By maintaining an interest in participants' perspectives and being attentive to their lived experiences, researchers uncovered valuable findings that significantly enhanced the study's validity. In examining complex, subjective experiences, the rigorous and systematic nature of hermeneutic phenomenology ensured the credibility and authenticity of the research (Moustakas, 1994). In alignment with the principles of connectivism and the use of educational technology, the study's findings provide valuable insights into the field of higher education and inform pedagogical practices aimed at improving student engagement and academic achievement.

Sampling Strategy

The research encompassed a diverse group of participants, including both tenured and non-tenured faculty members at public four-year universities in the southern region of the United States. These individuals possessed varying levels of knowledge and experience in educational technology and connectivism theory. The study emphasized demographic factors such as age, gender, university role, teaching experience, and technological proficiency to comprehensively understand the participants. The primary objective was to provide valuable insights into each participant's unique attributes and experiences. The research delved into the application of educational technology and connectivism across different academic disciplines. Faculty members with differing levels of proficiency and familiarity were purposefully selected from various universities in the southern region of the United States. The study considered various cultural and ethnic backgrounds and different teaching career stages. The overarching goal was to offer comprehensive insights into using educational technology and connectivism theory across institutions from diversified viewpoints.

The participant sample intentionally comprised both tenured and non-tenured individuals to ensure diverse experiences and perspectives were captured. The study specifically targeted academic departments affiliated with selected public universities to recruit participants. Formal requests were made to senior research compliance coordinators at multiple universities across the southern United States region to obtain permission to engage directly with faculty members. These requests included a letter of intent outlining the study's objectives and ethical considerations. Individual interviews were conducted at public universities within the southern United States region while maintaining the highest ethical standards to ensure precision, reliability, and confidentiality. A criteria screening form was employed to identify and validate suitable participants from public four-year universities in the southern United States who met specific criteria, such as possessing varied knowledge and experience in educational technology and connectivism theory relevant to teaching and utilizing technology to enhance student engagement. Each participant received a recruitment email containing a link to the criteria screening form, which was designed to collect essential information confirming their eligibility based on predefined criteria.

Data Collection Methods

A well-structured data collection plan was pivotal to the research process (Yin, 2017). This plan ensured ethical, methodical, and effective data gathering while leading to dependable, credible, and comprehensive research findings. The data collection plan provided guidance to researchers in selecting specific methods and strategies to gather pertinent data for their research inquiries (Lincoln & Guba, 1985). By integrating various data collection methodologies, researchers gained a profound understanding of the subject under investigation (Lincoln & Guba, 1985; Merriam, 2002; Patton, 2014). Various data collection methods were imperative when investigating intricate phenomena, such as educators' perceptions and anticipation of the evolution of teaching methods in response to technological advancements and the increasing focus on connectivism in higher education. This research study collected data through individual interviews, focus groups, and letter-writing activities. The sequence began with individual interview questions, followed by focus group session questions, and finally, the participants were provided with letter-writing prompts via email. This chosen sequence maximized the benefits of each method to gain a comprehensive understanding of how educators use educational technology to enhance student engagement and academic performance while applying connectivism principles and technological skills to improve student learning processes.

Data Analysis

The data collection methodology for this study encompassed individual interviews, focus groups, and letter writing with the subsequent synthesis of results aimed at obtaining a comprehensive understanding of the findings. The transcription process entailed using sophisticated transcription software, such as Otter.ai, complemented by manual reviews to accurately capture verbal and non-verbal nuances, including tone, pauses, and non-verbal cues such as facial expressions. This meticulous approach was indispensable for fully representing the emotional and psychological states of the participants. Within focus groups, the utilization of timestamps and speaker identification served to preserve contextual relevance, particularly in multi-participant interactions. During the analysis phase, hermeneutic phenomenology was applied to interpret participants' lived experiences by providing an in-depth exploration of educators' perceptions of technology integration in their teaching practices. Through hermeneutic reflection, the study delved into educators' complex and subjective experiences, which yielded valuable insights into their perspectives on technological advancements and their impact on educational practice.

Educators perceive the evolution of teaching methods in response to technological advancements as a significant and inevitable shift toward more networked, adaptive, and student-centered learning environments. The findings indicate that educators anticipate that AI-driven tools, adaptive learning platforms, and collaborative technologies will continue to reshape education by providing personalized learning experiences, enabling real-time feedback, and fostering greater engagement. The increasing emphasis on connectivism, where learning is viewed as a process of forming connections between diverse information sources and peers, is also seen as central to this evolution. Educators recognize that technology facilitates this shift by enabling students to interact with global networks, co-create knowledge, and access a broader range of resources. As technology advances, educators foresee a growing emphasis on collaborative learning, networked knowledge-building, and the ability to adapt teaching strategies to meet the needs of diverse learners in increasingly digital and globalized classrooms. This expectation reflects their understanding that technology is not just a tool but a key driver in transforming how education is delivered and experienced in higher education.

Trustworthiness

In this qualitative study, our aim was to investigate how educators perceive and anticipate the evolution of teaching methods in response to technological advancements and the increasing emphasis on connectivism in higher education. To ensure reliability and rigor, the research adhered to the principles of credibility, transferability, dependability, and confirmability, as outlined by Lincoln and Guba (1985). By meeting the trustworthiness

standards set forth by Lincoln and Guba, the study made meaningful contributions to understanding how technology is reshaping educational practices and pedagogical strategies. The research focused on educators' insights into how teaching is evolving through integrating digital tools, networked learning, and adaptive technologies framed within the connectivism theory. Comprehensive design and methodological precision were prioritized to produce credible and reliable findings, while reflexivity was employed to address potential researcher bias by acknowledging the researcher's role in interpreting the data. This reflexive approach helped ensure that the findings were grounded in participants' authentic experiences and minimized the influence of the researcher's preconceptions.

FINDINGS

In the analytical approach, the use of Atlas.ti allowed for a comprehensive synthesis of how educators perceive and anticipate the evolution of teaching methods in response to technological advancements and the increasing focus on connectivism in higher education. By aligning the findings with the central research question, I identified four key themes through data triangulation using the reduction process (Moustakas, 1994). The emerging themes were identified as (1) Integration of Technology in Teaching, (2) Connectivism as a Guiding Framework for Learning, (3) Adapting Teaching Methods for Lifelong Learning, (4) Transformative Potential of Educational Technology. Educators incorporating technology into teaching is considered inevitable, as online platforms and digital tools have become integral to delivering education. Connectivism, as a guiding framework, promotes collaborative, networked learning, while adaptive teaching methods emphasize the development of critical thinking and lifelong learning skills. The transformative potential of educational technology presents both exciting opportunities and significant challenges by necessitating thoughtful consideration of ethical, practical, and equity-related issues as educators navigate this evolving landscape.

Integration of Technology in Teaching

Educators are increasingly realizing the transformative potential of technology in higher education. The widespread adoption of online platforms, such as learning management systems (LMS), digital tools, and technology-enhanced learning environments, is revolutionizing the dissemination of education. Platforms, like Blackboard, Canvas, and Moodle facilitate a seamless blend of asynchronous and synchronous learning, which provides students with greater flexibility in engaging with course content. These technologies have broadened access to education, particularly for non-traditional learners such as working professionals and military personnel which allowed them to participate in learning on their own schedules. Essential tools like Zoom and Microsoft Teams enable real-time interaction, while digital resources such as multimedia, simulations, and interactive modules enhance student engagement. This technological shift has also made education more inclusive by providing accessibility features such as captioning and screen readers while ensuring all students can fully participate in the learning process.

Looking to the future, educators anticipate that advancements in artificial intelligence (AI), adaptive learning systems, and online collaboration tools will continue to reshape pedagogical practices. AI-powered systems are already being used to provide personalized feedback and tailor learning experiences to individual student needs. These adaptive learning platforms allow for real-time adjustments based on student progress to ensure that each learner receives the appropriate level of challenge and support. By integrating AI-driven analytics, educators can monitor student performance and intervene proactively when needed, thereby improving learning outcomes. Additionally, online collaboration tools, such as Slack and Google Workspace, are expected to enhance student engagement and teamwork further, which supports collaborative learning across geographic boundaries. While challenges such as the digital divide and data privacy persist, the opportunities for creating more flexible, personalized, and responsive learning environments are unlimited while positioning technology as a crucial component of the future of education.

Connectivism as a Guiding Framework for Learning

Connectivism is increasingly recognized as an essential framework for comprehending the evolution of teaching in higher education. The research indicates that connectivism is progressively serving as a guiding framework in developing teaching methodologies in higher education. Connectivism reflects the growing prevalence of digital technologies and globalized learning environments by emphasizing learning through networks and connections between diverse information sources. Educators recognize that students now have unlimited access to information through online platforms, digital tools, and collaborative spaces. Consequently, the conventional role of educators as the primary source of knowledge is transitioning into more of a facilitator. Educators are responsible for assisting students in navigating digital communication networks, facilitating the connection of information sources, and fostering critical thinking skills to enable the innovative application of knowledge. This transformation reshapes classroom dynamics by fostering an environment where students are encouraged to participate in peer-to-peer

learning, co-create knowledge, and engage in collaborative projects that transcend geographical and disciplinary boundaries.

Educators anticipate that networked learning and digital collaboration will be central to teaching in the future. Platforms such as discussion forums, social media, and online communities allow students to participate in global discussions and learn from diverse perspectives. This pedagogical approach aligns with connectivism, where knowledge derives from connections between various sources rather than from a single origin. Additionally, educators anticipate a growing focus on teaching students how to gather and utilize information from interconnected networks effectively. This learning process will equip students with the necessary skills to thrive in a rapidly evolving, information-driven world. As digital literacy becomes increasingly crucial, educators are expected to adjust their teaching approaches further to assist students in constructing learning networks and participating in collaborative, self-directed learning.

Adapting Teaching Methods for Lifelong Learning

The research findings emphasize that educators increasingly recognize the need to adapt teaching methods to foster lifelong learning in response to rapid technological advancements. Traditional education models, which often focus on content delivery and rote memorization, are now considered insufficient for preparing students for the challenges of an unpredictable and rapidly evolving world. Instead, educators see a growing demand for teaching strategies that promote adaptability, critical thinking, and problem-solving skills. With the rise of automation, artificial intelligence, and the constant emergence of new technologies, students must develop the ability to learn and adapt to dynamic environments continuously. This shift requires a focus on teaching students specific content and how to learn effectively, think critically, and solve complex problems in diverse contexts.

Educators anticipate that future teaching practices will increasingly focus on equipping students with the skills necessary to navigate evolving technologies and apply their knowledge across various fields and industries. Active learning approaches, such as project-based learning, collaborative problem-solving, and real-world applications, will become more prevalent as they encourage students to engage critically with the content and develop practical solutions to challenges. Additionally, adaptive learning technologies, which offer personalized instruction and feedback, are seen as valuable tools for fostering lifelong learning. By creating learning environments that prioritize adaptability and continuous skill development, educators aim to better prepare students for the demands of a rapidly changing global workforce, where the ability to learn, unlearn, and relearn will be essential for success.

Transformative Potential of Educational Technology

The research findings indicate that educators recognize the potential of educational technology to transform teaching and learning practices significantly. Technological advancements, such as artificial intelligence, virtual reality, and adaptive learning platforms, are seen as powerful tools that can revolutionize pedagogy by creating more interactive, personalized, and engaging educational experiences. Educators who leverage educational technology tools have the potential to enhance student learning outcomes through customized instruction, immediate feedback, and immersive learning experiences not previously possible in traditional educational settings. Educators view this shift as a driving force to transition from passive knowledge transfer to more student-centered, active learning approaches to foster deeper engagement and critical thinking skills. Additionally, the flexibility and accessibility of technology create an inclusive learning environment catering to various learning styles and preferences.

The potential advantages of technology in education are substantial, but they also present challenges that educators must confront. One major concern is the issue of digital equity and access, as not all students have equal access to the technology required for advanced learning. The digital divide, particularly for students from underrepresented or disadvantaged backgrounds, poses a risk of increasing educational inequalities. Additionally, educators must navigate the ethical implications of relying on data-driven technologies, including concerns about student privacy and the use of personal data. As technology continues to evolve, educators are tasked with ensuring that its integration into education is impartial, ethical, and supportive of all learners while also managing the complexities and uncertainties associated with the ongoing rapid changes.

Research Question Response: Expanding and Empirically Supporting Connectivism

How do educators perceive and anticipate the evolution of teaching methods in response to technological advancements and the increasing focus on connectivism in higher education? The research study's findings reveal that educators perceive the inevitable and transformative nature of the evolution of teaching methods in response to technological advancements. Educators in higher education view technology as fundamentally reshaping educational approaches, transitioning from traditional, instructor-led models to more student-centered and flexible approaches. Educational technological tools, such as learning management systems (LMS), online platforms, and

multimedia resources, are considered essential in creating interactive and engaging learning environments. Participants emphasized the increasing role of artificial intelligence (AI) and adaptive learning platforms in providing personalized learning experiences. These technologies enable real-time feedback, content adjustments based on individual student progress, and the increase of student engagement in the learning environment tailored to each student's needs. Educators anticipate that AI-driven tools will significantly enhance the accessibility and customization of education, ultimately leading to improved student engagement and academic performance.

In the context of connectivism, educators are increasingly recognizing learning as a networked process. Students are expected to establish connections between diverse sources of information, peers, and digital communities. The transition from traditional classroom-based teaching to online collaboration and global learning networks is essential to this transformation. Educators anticipate that the emphasis on collaborative learning environments will continue to expand, aided by platforms such as Zoom, Microsoft Teams, Slack, Discord, and social media, which support peer interaction and the co-creation of knowledge. Implementation of these technologies aligns with the principles of connectivism, where knowledge is formed through engagement in interconnected digital spaces. Educators anticipate that as students become more engaged in global learning communities, the emphasis will shift from delivering content to guiding students in navigating and synthesizing information from various disseminated sources. Educators maintain an optimistic outlook on the future of teaching methods, which recognizes the essential role of educational technology and connectivism in transforming the evolution of adaptable, collaborative, and networked learning experiences in higher education.

DISCUSSION

The findings of this research have significant implications for higher education practice, particularly in the design and implementation of educational technology to enhance learning outcomes. Educators are encouraged to integrate adaptive learning systems and AI-driven platforms, which provide real-time, personalized feedback and enable tailored learning experiences. These educational technology tools can adjust content delivery based on individual student progress and foster more engaged and effective learning. Administrators should focus on creating technology-rich learning environments by incorporating platforms such as learning management systems (LMS), which centralize resources and facilitate both synchronous and asynchronous learning. Additionally, implementing online collaboration tools, such as Microsoft Teams and Zoom, allows for more dynamic student interaction, particularly in networked learning contexts. Policymakers must prioritize digital equity, which ensures all students have access to the necessary technology and resources. This will require investment in infrastructure and support systems to bridge the digital divide, ensuring that technology-enhanced learning is inclusive and equitable for all learners.

The research also contributes to the theoretical development of connectivism by providing empirical support for its relevance in contemporary education. The findings align with connectivism's emphasis on learning through networks, where students build knowledge by engaging with digital tools and collaborating with peers across diverse platforms. The study suggests that AI-driven adaptive learning can be considered an extension of connectivism. AI enables the formation of personalized learning networks, where technology mediates connections and actively adapts content to learners' needs, further reinforcing the concept of distributed knowledge. This adaptation adds a layer of complexity to connectivism by expanding its scope to account for the evolving role of artificial intelligence and personalized learning in modern educational environments.

The use of hermeneutic phenomenology in this study was essential for understanding educators' complex, subjective experiences as they navigate digital learning environments. By focusing on participants' lived experiences, this approach provided insights into how educators interpret and adapt to the use of educational technology. Hermeneutic phenomenology helps bridge theory and practice by revealing how theoretical concepts, such as connectivism, manifest in real-world educational settings. This method allows for a deeper understanding of how educators and students interact with technology while ensuring that theoretical frameworks remain grounded in the practical realities of teaching and learning. By interpreting individual experiences, hermeneutic phenomenology offers a more nuanced view of how educational technologies can be designed and implemented to meet users' needs, ultimately fostering more effective and meaningful learning outcomes.

CONCLUSION

The study offers valuable insights into how educators perceive and anticipate the changes in teaching methods due to technological advancements and the increasing focus on connectivism in higher education. The main findings reveal that educators consider integrating educational technology, such as learning management systems (LMS), AI-driven platforms, and collaborative digital technology as essential for creating adaptable, personalized, and interconnected learning environments. Educational technologies are seen as necessary for promoting student-centered approaches, enabling learners to actively, adaptively, and collaboratively construct knowledge.

Additionally, educators recognize that digital technology is reshaping their roles, transitioning from being the primary sources of knowledge to facilitators who navigate students through intricate digital information networks. The implications of these findings for higher education are substantial, which emphasizes the importance of integrating technology to enhance student engagement, learning outcomes, and academic achievement to equip students for the demands of a rapidly evolving world.

The research study contributes significantly to the field of connectivism theory by expanding its application in modern educational contexts. While connectivism traditionally emphasizes learning through human and informational networks, this research introduces the role of educational technology and adaptive learning platforms as active participants in the knowledge-creation process. Technology, such as AI systems, can offer personalized learning paths and real-time feedback by extending the networked learning environment to help learners connect with the most relevant information and resources. The expansion of connectivism emphasizes the dynamic and evolving nature of learning in technology-enhanced settings, where students must navigate increasingly complex digital ecosystems. In practical terms, the research findings emphasize the importance of educators and institutions adopting technologies that align with connectivism principles, ensuring students acquire the skills to synthesize information from diverse sources.

To further explore the evolving relationship between educational technology and connectivism, future research should prioritize the empirical study of refining the connectivism framework within diverse educational contexts and with emerging technologies. Studies could examine how adaptive educational technologies impact students' capacity to form knowledge networks and how AI-driven systems influence the learning process across various disciplines, including STEM, social sciences, and the arts. Additionally, researchers should explore the role of virtual and augmented reality in enhancing connectivism learning environments, particularly in fields that heavily rely on experiential learning. Comparative studies across educational levels (e.g., K-12, higher education) and global regions could generate valuable insights into how technological and cultural factors impact the integration of educational technology and connectivism practices. Further exploration of digital equity and the ethical implications of digital technology in education is also critical to ensuring that educational technology fosters inclusive and equitable learning environments. By expanding the empirical base of connectivism and exploring its practical applications, future research can continue to inform both theory and practice in higher education.

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The Training Curriculum Development Based on the Language Teaching for Communication Approach to Develop Basic Chinese Speaking for Graduate Diploma Program in Teaching Profession Students

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Abstract
The training curriculum based on the Language Teaching for Communication Approach, organizing the learning process to emphasize language acquisition through actual communication. It prioritized student-centered activities, providing opportunities to practice language and communicate meaning in various situations. The objectives of this research were to: 1) develop a training curriculum based on the Language Teaching for Communication Approach aimed at improving basic Chinese speaking skills for Graduate Diploma Program in Teaching Profession students, ensuring effectiveness according to the criteria 75/75, 2) compare the students' basic Chinese speaking before and after training through the training curriculum based on the Language Teaching for Communication Approach, and 3) assess the students' satisfaction with the training curriculum. The research samples consisted of 1 classroom with 26 Diploma Program in Teaching Profession students at the Faculty of Technical Education, Rajamangala University of Technology Thanyaburi, Thailand, in the 2023 academic year. The sample was selected by cluster random sampling. The research instruments were: 1) a training curriculum; 2) a knowledge and understanding test; and 3) a satisfaction questionnaire. The data were analyzed using mean, standard deviation, E1/E2 efficiency, and a dependent samples t-test. The research findings were as follows: 1) a training curriculum based on the Language Teaching for Communication Approach was effective according to 83.46/80.73, which was higher than the set criterion of 75/75, 2) the students' basic Chinese speaking after the training was higher than before at the statistical significance level of.05; and 3) the students' satisfaction with the training curriculum was at a high level.
Keywords: training curriculum, basic Chinese speaking, Language Teaching for Communication Approach

Introduction

In recent years, China's peaceful rise has captured global attention, sparking a growing interest among foreigners in understanding the country (Sun Yue, 2014). This rise elevated China's political and economic stature and drove the global spread of the Chinese language, transforming language learning into a collective effort supported by favorable social environments (Qiu Ye, 2023). As the language of the Chinese nation, Chinese embodied the rich tapestry of Chinese civilization and the essence of Chinese culture. Therefore, language was a "calling card" for a region or nation. Through the exchange and propagation of language, culture was seamlessly conveyed and diffused (Liu Yujia, 2021).

This growing global significance of Chinese has led to a surge in educational curricula focused on teaching the language. Chinese language instruction aimed primarily at developing proficiency and was typically divided into two categories: native speakers and those learning Chinese as a second language (Wang Dan, 2014). For non-native speakers, the abstract nature of cultural learning posed significant challenges, as cultural concepts were difficult to teach in isolation (Ma Hongyan, 2023). Various teaching strategies and techniques have been developed to address these challenges, emphasizing key language skills: listening, speaking, reading, and writing (Lorena Manaj Sadiku, 2015). Notably, teaching Chinese as a foreign language focused on cultivating oral communication skills, considered essential for effective language use (Yao Jianmei, 2022).

In addition to linguistic proficiency, effective language learning requires using the language in socially and culturally appropriate ways. The Language Teaching for Communication Approach introduced significant changes in teaching methods, materials, learning objectives, and assessment practices (Michael Byram, et al., 2002). This approach, which emphasized communication and contextual learning, aligned well with student-centered educational philosophies and was particularly suited to learners who thrived in interactive, communicative environments (Zhang Jiaxin, 2019).

Acquiring a language did not always equate to achieving fluency. This discrepancy could arise from rigid formal training methods that prioritized theoretical knowledge over practical usage. Additionally, a lack of communicative activities could inhibit learners' ability to use the language effectively. Richards emphasized that learners should be encouraged to actively participate and express their ideas, regardless of their proficiency level. The focus should have been on fostering a willingness to engage and practice consistently, as this approach promoted gradual improvement and fluency over time (Richards, 2006). As had been seen, communicative language teaching emphasized the importance of interaction and the use of language in real situations. The objective was to enhance learners' communication competencies, encompassing both grammatical accuracy and the capacity to utilize language effectively and appropriately across diverse contexts.

In addition, three key elements of learning theory were central to effective practices: the Communication Principle, the Task Principle, and the Meaningfulness Principle. These principles established a theoretical foundation that ensured teaching methodologies were both practically applicable and firmly rooted in robust educational theory (Richards and Rodgers, 2014).

It also highlighted the importance of teachers mastering the method and embodying their educational principles in actual teaching. Practically, it was crucial to balance communication and grammatical accuracy, prioritize cultural distinctions, provide personalized instruction, and align with the educational system (Jiang Jie, 2022). Focusing on these pedagogical challenges, the research developed a curriculum specifically designed for foundational oral Chinese training for the Graduate Diploma Program in Teaching Profession students. This curriculum, grounded in the Language Teaching for Communication Approach, aimed to equip students with the necessary skills and expertise to effectively use Chinese in real-world contexts. By refining and improving these curricula, educational institutions could better support students in mastering the language, thereby enhancing the overall effectiveness of Chinese language education globally

Research Objectives

1. To develop a training curriculum based on the Language Teaching for Communication Approach to develop basic Chinese speaking for Graduate Diploma Program in Teaching Profession students to be effective according to the criteria 75/75.
2. To compare the students' basic Chinese speaking before and after training through the training curriculum based on the Language Teaching for Communication Approach for Graduate Diploma Program in Teaching Profession students.
3. To assess the students' satisfaction with the training curriculum based on the Language Teaching for Communication Approach for Graduate Diploma Program in Teaching Profession students.

Literature Review

The training curriculum was described as a structured process intended to modify attitudes, enhance knowledge, and develop skills and behavior through learning experiences. The goal was to achieve effective performance in specific activities, developing individuals' abilities to meet current and future organizational needs (Beardwell & Holden, 2001 cited in Wajdi Milhem and Khalil Abushamsieh, 2014). The training curriculum was linked to a planning process and was considered an ongoing effort involving task replication to achieve the intended benefits. The design and implementation of the training programs were informed by multiple disciplines, with a particular emphasis on sociolinguistics. The importance of teaching methods was emphasized, as not all training courses were suitable for a single teaching method. The choice of method was based on training objectives, course content, and goals (Liu Wei, 2013). The effectiveness of teaching methods was crucial in achieving the desired training outcomes. The successful completion of tasks and attainment of training objectives required an integration of the teacher's instructional methods and the student's learning strategies (Wu Wensheng & Zhu Xiaoli, 2022).

Communicative Language Teaching (CLT): The Communicative Language Teaching (CLT) approach emphasizes cultivating students' language communication abilities. It was characterized by being student-centered, focusing on skill training, and aiming for real or simulated communication (Huang Huihua, 2016). According to Richards (2006), CLT was based on principles regarding language teaching goals, how learners acquired language, the types of classroom activities that enhanced learning, and the roles of teachers and learners. CLT has been widely discussed since the 1970s and was known for its emphasis on student participation, leading to better engagement and learning outcomes (Higgs & Clifford, 1982; Brown, 2000). Recent advancements in technology and teaching methodologies also contributed to improved outcomes in a Learner-Centered Teaching (LCT) environment (Kumar, 2020; Nikolaos Tzenios, 2022).

This underscored the critical importance of a structured and deliberate approach to both training and teaching, emphasizing the necessity of adapting methods to align with the specific needs of learners and the overarching objectives of the training. The emphasis on communicative approaches in language teaching reflected a broader trend towards learner-centered education, which aimed to improve engagement and effectiveness through tailored methodologies and technological integration.

The conceptual framework for the research could be summarized as illustrated in Figure 1.

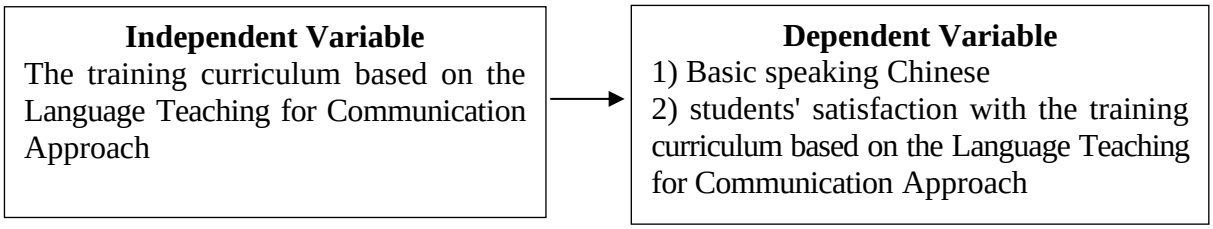

Figure 1 Conceptual Research Framework

Methodology

The study was designed as experimental research, employing a one-group pretest-posttest design. The details of the research methodology were as follows:

1. Population and Sample

The population of this study comprised all Graduate Diploma Program in Teaching Profession students at the Faculty of Technical Education, Rajamangala University of Technology Thanyaburi, Thailand, in the 2023 academic year. The total number of students was 134, and they were distributed among 5 classrooms. The research sample was selected by cluster random sampling and consisted of 1 classroom with 26 students.

2. Variables

The variables consisted of the independent variable: The training curriculum based on the Language Teaching for Communication Approach, and the dependent variables: 1) basic speaking Chinese, and 2) students' satisfaction with the training curriculum based on the Language Teaching for Communication Approach.

3. Research instrument

The research instruments used in the experiments and data collection were divided into the following categories:

3.1 The training curriculum based on the Language Teaching for Communication Approach consisted of 18 academic hours, covering the following 6 units: 1) Daily talk, 2) Shopping, 3) Introduce myself, 4) Relationship, 5)Weather, and 6) Holiday. The training curriculum was developed through the following steps:

1) Theories and concepts related to the training curriculum and the Language Teaching for Communication Approach were studied.

2) The training curriculum was developed based on the Language Teaching for Communication Approach. The main components of the training curriculum included 12 elements: Principles and Rationale, Training Curriculum Objectives, Training Curriculum Content, Training Curriculum Structure, Training Curriculum Implementation Guidelines, Training Activities based on the Language Teaching for Communication Approach, Target Groups, Dates, Times, and Locations, Learning Resources/Equipment, Measurement and

Evaluation, Expected Benefits, and Training Schedule. The training activities based on the Language Teaching for Communication approach were designed in three steps:

Presentation: The teacher provided language information to the students, introducing new content aimed at helping them understand the meaning and common usage of the language, including pronunciation, vocabulary, and appropriate grammatical structures for different situations, along with relevant rules.

Practice: The students engaged in using the language they had learned through controlled or guided practice, with the teacher leading the exercises in a step-by-step manner. The goal was for students to memorize correct language forms, understand their meanings, and learn how to use those language structures appropriately.

Production: The students practiced using the language for communication, applying the knowledge they had gained in the classroom to real or simulated situations. The teacher assigned tasks or scenarios and primarily acted as a guide, allowing students to use the language in various contexts.

3) The training curriculum based on the Language Teaching for Communication Approach was proposed to the advisor and five experts. The evaluation of the appropriateness of the training curriculum outline was at a very good level, and the Item-Objective Congruence (IOC) value, according to the experts' opinions, was found to be 0.80-1.00 in all aspects, indicating consistency in the training course outline.

4) The draft of the training curriculum was tryout with 30 Graduate Diploma Program in Teaching Profession students who were not part of the sample. The reliability of the training curriculum was analyzed using Cronbach's alpha coefficient (α), and the analysis results showed that the reliability was equal to 9.86. The training curriculum was then improved and finalized based on the Language Teaching for Communication approach before collecting data.

2. The assessment of basic Chinese speaking was conducted using a rubric scoring method, following these steps: first, relevant curriculum, theories, and assessment concepts were reviewed. The initial assessment design for Basic Chinese Speaking was then developed and presented to an advisor and five experts. These experts evaluated the assessment's appropriateness, and their ratings were analyzed. The assessment was refined based on the Item-Objective Congruence (IOC) index, with an analysis revealing an IOC value of 0.80-1.00. Subsequently, the assessment was piloted with 30 students outside the main sample, further refined, and finalized for publication before data collection.

3. Satisfaction questionnaire: The satisfaction questionnaire was developed using a 5-level Likert scale, following these steps: initially, the questionnaire was drafted and presented to an advisor and five experts for evaluation. The experts assessed the appropriateness of the questionnaire, and their feedback was analyzed. The questionnaire was subsequently refined based on the Item-Objective Congruence (IOC) index, with results indicating an IOC value of 1.00. The reliability of the satisfaction assessment questionnaire was analyzed using Cronbach's alpha coefficient (α), and the analysis results showed that the reliability was equal to 9.82. After further refinement, the questionnaire was finalized and published before data collection.

4. Data Analysis

The data analysis encompassed an examination of experimental results, including the calculation of fundamental statistics for test scores and learning achievements. Each analysis, along with an overarching summary, was presented in a comprehensive table that accompanied the lecture. Additionally, a customized training curriculum was developed, grounded in the communicative approach to language teaching, to enhance the basic Chinese speaking skills of the Graduate Diploma Program in Teaching Profession students to meet the 75/75 efficacy criteria. This process involved the analysis of data using mean, standard deviation, and the application of E1/E2 measures. A comparative analysis was also conducted to assess the students' basic Chinese speaking abilities before and after completing the curriculum, employing mean, standard deviation, and a dependent sample t-test. Finally, the satisfaction level of students who completed the curriculum was evaluated, with the analysis incorporating mean, standard deviation, and interpretation according to specific criteria.

Findings and Discussions

1. The analysis of the effectiveness of the training curriculum based on the Language Teaching for Communication Approach to develop basic Chinese speaking for Graduate Diploma Program in Teaching Profession students.

The analysis involved calculating the E1/E2 ratio according to the effectiveness criteria of 75/75. An analysis of the Language Teaching for Communication (LTC) approach's efficacy in developing basic Chinese speaking skills among Graduate Diploma Program in Teaching Profession students was also presented in Table 1.

Table 1. The result of determining the effectiveness of the training curriculum according to the 75/75 criterion.

	The process measurement			Posttest			E_1/E_2
n	$\sum X_2$	A	E_1	$\sum X_2$	B	E_2	
26	651	16.76	83.46	209.90	24.29	80.73	83.46/80.73

From Table 1, it was observed that the average score for basic Chinese speaking in the post-training tests across all six units was 16.76 out of 20, equivalent to 83.82%. Additionally, the score from the assessments measuring basic Chinese speaking after the training was 24.29 out of a possible 30, equivalent to 80.73%. Therefore, the developed training program demonstrated effectiveness (E1/E2) with scores of 83.46/80.73, surpassing the established criteria of 75/75.

Table 2. Effectiveness Index (E.I.)

The analysis result	Effectiveness Index (E.I.)	Percentage of Effectiveness Index
	0.6766	67.66
Interpreting the results	After training using the training curriculum, there was an increase in scores by percentage 67.66	

From Table 2, it was found that the Effectiveness Index (E.I.) was 0.6766, or 67.66%. In summary, after completing the training curriculum, the scores increased by 67.66%. It could be observed that the obtained efficiency index value exceeded 0.5, which aligned with the acceptance criteria requiring the efficiency index value to be at least 0.5. Therefore, the developed course or innovation was deemed effective.

The training curriculum based on the Language Teaching for Communication Approach to develop basic Chinese speaking for Graduate Diploma Program in Teaching Profession students was effective according to the 83.46/80.73, which was higher than the set criterion of 75/75. This outcome was attributed to a systematic training curriculum design and development process, which involved four steps: Step 1 studying and analyzing the foundational information. Step 2: The training curriculum was designed and developed. Step 3: A trial of the training curriculum was conducted. Step 4: The training curriculum was evaluated and improved (Saylor and Alexander, 1974 cited in Chaiwat Suttharirak, 2014). This process aligned with the approach described by Chuchai Smitthikrai (2007), where curriculum development began with the determination of curriculum goals, followed by the design and creation of the curriculum. Afterward, the curriculum was implemented and evaluated in sequence. Additionally, the drafted training curriculum based on the Language Teaching for Communication Approach, aimed at developing basic Chinese speaking skills, underwent a quality evaluation process before being implemented. The experts' evaluation of the curriculum indicated that it was of good quality, demonstrating that the developed training curriculum could be used effectively in training.

According to the findings of Dai Yunli (2020), the training course on Basic Chinese Communication included five learning units: Welcome to China, Let's Learn Chinese, Self-Introduction, My Family, and Chinese Culture. The effectiveness of the training course met the E1/E2 criteria at 81.49/81.53. Additionally, Caijun Lin and Nisareen Wangtakwadeen (2017) found that the developed training curriculum, using the Chinese communicative approach for the private sector tourism business of entrepreneurs, achieved an efficiency (E1/E2) of 83.50/87.00, which met the established requirement of 80/80 and had an effectiveness index (E.I) of 0.68.

2. The analysis compared basic Chinese speaking before and after training through the training curriculum based on the Language Teaching for Communication Approach of the Graduate Diploma Program in Teaching Profession students.

Comparing basic Chinese speaking before and after training through the training curriculum based on the Language Teaching for Communication Approach of the Graduate Diploma Program in Teaching Profession students was also presented in Table 3.

Table 3. Mean, Standard Deviation, dependent samples t-test, and the level of statistical significance to compare basic Chinese speaking before and after the training curriculum.

Testing	n	$\bar{x}$	S.D.	df	t-test	Sig. (2-tailed)
Pre-test	26	4.04	0.649	16.246*	25	0.000
Posttest	26	8.07	0.924			

*p< .05

Table 3. It was found that the students' basic Chinese speaking had a mean score of 4.04 ($\bar{x}$ = 4.04, S.D. = 0.649) before the training curriculum based on the Language Teaching for Communication Approach and a mean score of 8.07 ($\bar{x}$ = 8.07, S.D. = 0.924) after the training. When comparing the t-scores, it was also found that the students' basic Chinese speaking ability after training was higher than before at a statistical significance level of .05. The basic Chinese speaking skills after completing the training curriculum based on the Language Teaching for Communication Approach were significantly higher than before, with a statistical significance level of .05. This improvement occurred because the training curriculum was designed following the steps of the language teaching for communication approach, a teaching model that centered on students. The core principle of the Communicative Language Teaching approach focused on learning how to use the language effectively in real-life communication rather than merely acquiring knowledge about the language itself (Savignon, 2002). Consistent with Sumitra Angwattanakun (1997), the language teaching for communication approach was a form of teaching that did not merely instruct learners in language forms or structures, but rather emphasized enabling learners to apply their knowledge in real-life situations. This approach represented a significant pedagogical method, emphasizing the development of students' language skills within authentic communicative contexts. It also demonstrated the teacher's mastery of the method and their ability to embody educational principles in actual teaching. In practice, it was crucial to strike a balance between communication and grammatical accuracy, prioritize cultural distinctions, provide personalized instruction, and align with the educational system (Jiang Jie, 2022).

According to the findings of Pittayarat Yamprayoon and Rossarin Jermtaisong (2021), there *was* a statistically significant difference at the level of 0.05 in Chinese communication skills for everyday use before and after students *studied* the language for communication instruction combined with grouping techniques.

3. Analysis of assessing the students' satisfaction with the training curriculum based on the Language Teaching for Communication Approach.

The assessment of the students' satisfaction with the training curriculum based on the Language Teaching for Communication Approach *was also presented* in Table 4.

Table 4. Mean, Standard Deviation, and meaning of the students' satisfaction with the training curriculum based on the Language Teaching for Communication Approach.

Item of the assessment the satisfaction	$\bar{x}$	S.D.	Meaning
1. Curriculum Content	4.56	0.64	Highest agree
2. Training Activities	4.56	0.64	Highest agree
3. Training Materials	4.44	0.75	Highest agree
4. Audiovisual Equipment	4.57	0.75	Highest agree
5. Training Venue	4.42	0.75	Highest agree
6. Training Duration	4.48	0.78	Highest agree
7. Training Evaluation	4.42	0.81	Highest agree
8. Trainer	4.52	0.78	Highest agree
Total	**4.48**	**0.75**	**Highest agree**

Table 4. It was found that the satisfaction level of the Diploma Program in Teaching Profession students who underwent the training curriculum based on the Language Teaching for Communication Approach was at the highest level of agreement ($\bar{x}$ = 4.48, S.D. = 0.75).

When considering the various aspects, it was found that the satisfaction level of graduate diploma teaching professional students who underwent the training curriculum based on the Language Teaching for Communication Approach was at the highest level of agreement across all aspects. The aspects, sorted by the highest mean, were as follows: Audiovisual Equipment ($\overline{x}$ = 4.57, S.D. = 0.75), Curriculum Content ($\overline{x}$ = 4.56, S.D. = 0.64), Trainer ($\overline{x}$ = 4.52, S.D. = 0.78), Training Activities ($\overline{x}$ = 4.48, S.D. = 0.80), Training Duration ($\overline{x}$ = 4.48, S.D. = 0.78), Training Materials ($\overline{x}$ = 4.44, S.D. = 0.75), Training Venue ($\overline{x}$ = 4.42, S.D. = 0.75), and Training Evaluation ($\overline{x}$ = 4.42, S.D. = 0.81).

The satisfaction level of graduate diploma teaching professional students who completed the training curriculum based on the Language Teaching for Communication Approach was high. This result was due to the systematic implementation of the training course according to the planned and prepared steps. Various factors, including the budget, materials, equipment, course documents, and locations that served as sources of knowledge and experience, were all well-prepared and ready to support the training. This thorough preparation contributed to the overall satisfaction with the course. Based on the findings of Dai Yunli (2020), Chakkaphan Prasomsup et al. (2024), and Xiang Yonghong et al. (2024), student satisfaction with the training curriculum was at a high level. This was consistent across the studies.

Conclusions

As language education continued to evolve, the Language Teaching for Communication (LTC) approach, emphasizing communicative competence, has emerged as a promising framework for developing effective language training curricula. By prioritizing meaningful communication, LTC aims to equip learners with the skills necessary to use language effectively in real-world contexts. While challenges in implementation exist, careful planning, resource management, and ongoing feedback are essential for ensuring the curriculum's relevance and effectiveness. Moreover, training teachers in the LTC approach is crucial to fostering a shift from traditional knowledge transmission to facilitation and promotion of autonomous learning.

The findings of this study highlight the limitations that can impede the successful acquisition of Chinese as a foreign language. A strong foundation in Chinese words, Pinyin, and cultural context is essential for effective communication. Given the visual nature of Chinese characters, mastering reading and pronunciation presents unique challenges for non-native speakers. The research sample, consisting of Graduate Diploma Program in Teaching Profession students with limited prior exposure to Chinese, underscores the difficulties faced by learners without a strong linguistic and cultural background. Additionally, the lack of opportunities for daily Chinese language use in a Chinese-speaking environment significantly hinders language acquisition. Creating immersive learning experiences that simulate real-world communication can greatly enhance language proficiency and increase the likelihood of successful Chinese language learning. Future research should explore the potential of this approach in conjunction with other language skills, such as listening, writing, and reading, as well as investigate the impact of factors like learning persistence on language acquisition.

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